# PROPOSED PLAN

# FOR AN

# AMENDMENT TO THE

# RECORD OF DECISION FOR THE

# EMF SUPERFUND SITE

# SIMPLOT PLANT OPERABLE UNIT

# POCATELLO, IDAHO

**PREPARED BY:**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**REGION 10**
**SEATTLE, WA**

**MARCH 2009**

## INTRODUCTION AND OVERVIEW OF THE PROPOSED PLAN

In 1998, the Environmental Protection Agency (EPA), issued a Record of Decision (ROD) for clean up of the Eastern Michaud Flats (EMF) Superfund Site, including the Simplot plant area, now the Simplot Operable Unit (OU).

Results from the remedial investigation and other site studies were included in the ROD which identified Contaminants of Concern (COCs) in soil, groundwater, and air. The ROD concluded that contaminated groundwater beneath the Simplot OU is being discharged to the Portneuf River through a series of springs to the north. Of greatest concern were arsenic levels which posed unacceptable risks to human health and the environment. The selected remedy in the ROD included the installation of a system to extract the contaminated groundwater and to control the sources of arsenic, especially the gypsum stack.

In 1999, the Idaho Department of Environmental Quality, (IDEQ) evaluated water quality conditions in the Portneuf River. IDEQ's report concluded that the springs and underflow to the river discharging Simplot's contaminated groundwater were also responsible for the largest amount of phosphorus (in the form of orthophosphate) to the River. In 2003, a Total Maximum Daily Loading (TMDL) Implementation Plan was developed to address contaminant loading to the River. The TMDL plan identifies sources of phosphorus to the River and sets reduction levels for each source.

In the TMDL plan, Simplot said it would meet its approximately 80% phosphorus reduction goal for the first phase of TMDL reduction through the same groundwater extraction system it would use to reduce arsenic in accordance with the ROD. EPA had also expected the extraction system it selected in the ROD to adequately address Simplot's phosphorus releases. Consequently, phosphorus was not specifically identified in the ROD as a COC. EPA has now determined that either Simplot's extraction system has to be expanded or its phosphorus sources have to be sufficiently reduced (or both, in some combination) to meet the goals of the TMDL plan.

EPA is now proposing to amend the ROD with a Preferred Alternative (revised cleanup) to meet the phosphorus reduction goals in the River to protect water quality and aquatic life. The major components of the Preferred Alternative are:

- Addition of phosphorus as a COC;
- Describe and quantify ongoing and past releases of COCs at or near Simplot's phosphoric acid plant;
- Develop and implement a verifiable plan to control the sources of phosphorus and other COCs within the Simplot OU;
- Install a synthetic liner on the receiving surface of the gypsum stack to reduce water from infiltrating through the stack into groundwater;
- Develop protective numerical cleanup levels for phosphorus in groundwater to meet the TMDL for the River, and identify monitoring points in the River and groundwater;
- Continue to develop, operate, maintain and augment to the extent necessary, if any, the groundwater extraction system to keep arsenic and phosphorus levels at or below cleanup standards.

EPA is the lead agency responsible for implementing the ROD as amended, with IDEQ and the Shoshone-Bannock Tribes (SBT) providing support. EPA has prepared this Proposed Plan in consultation with the support agencies pursuant to Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The Preferred Alternative addresses Simplot's arsenic and phosphorus releases efficiently and effectively in terms of the nine criteria for the selection of Superfund remedial action. The Preferred Alternative is consistent with the remedies selected for the remainder of the EMF Superfund Site.

**Your Comments**: Comments on this Proposed Plan are welcome during the comment period from March 16th to April 15th and on the day of the public meeting on March 17th at the Pocatello City Hall

Chambers, Pocatello, Idaho, and on March 18th at the Fort Hall Business Council Chambers, Fort Hall, Idaho. Both meetings are from 6:00PM to 9:00PM and oral and written comments will be accepted.

Written comments may be submitted either at the public meeting or mailed to:

***Ms. Kira Lynch***
***US EPA Region 10***
***1200 Sixth Ave, Suite 900***
***Office of Environmental Cleanup, ECL-113***
***Seattle, WA 98101***
***(T) 206-553-2144***
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***Lynch.kira@epa.gov***
***If emailing comments, please put "Simplot ROD Amendment" in subject line.***

Submitted comments and input from the public meeting will be considered in the selection of the remedial action alternative that will be implemented at and for the Simplot OU.

**Proposed Plan Organization:** Following this introduction, the Proposed Plan contains major sections including Site Background, Site Characteristics, Scope and Role of the Proposed Response Action, Summary of Site Risks, Remedial Action Objectives, Summary of Remedial Alternatives, Evaluation of Alternatives, Preferred Alternative, and Community Participation.

The Proposed Plan summarizes information that can be found in greater detail in the following documents and other documents contained in the Administrative Record file for the EMF Superfund Site, which may be reviewed at any of the following locations:

**Idaho State University Library**
Government Documents
850 South 9th Avenue
Pocatello, Idaho 83209
(208) 282-3152

**Shoshone-Bannock Library**
Tribal Business Center
Pima Drive and Bannock Avenue
Fort Hall, Idaho 83203
(208) 478-3882

**EPA Region 10 Superfund Records Center**
1200 Sixth Avenue, Suite 900, ECL-076 (7th Floor)
Seattle, WA 98101
(206) 553-4494

This Proposed Plan has been prepared to facilitate public involvement in the remedial action selection process. It presents EPA's rationale for the Preferred Alternative amending the remedial action at and for the Simplot OU, and also provides a summary of the other remedial alternatives evaluated as part of the selection process. The Preferred Alternative may be modified or replaced based on new information or public comments. The public is vigorously encouraged to review and comment on this Proposed Plan.

## SITE BACKGROUND

**EMF Facilities Description:** The Site is located in Southeast Idaho, approximately 2.5 miles northwest of Pocatello (See Figure 1, Regional Setting). The Site includes two adjacent phosphate ore processing plants, the FMC Corporation Elemental Phosphorus Plant (FMC) and the J.R. Simplot Company Don Plant (Simplot). Both began operating in the 1940s. The FMC plant ceased operations in December 2001 and was subsequently demolished. These plant areas occupy approximately 2,475 acres (approximately 1,450 for FMC, and 1,025 for Simplot). Figure 2 shows land ownership around the FMC and Simplot plants. The Site encompasses the areal extent of contamination at or from both plants including what the ROD described as the Off-Plant Subarea for portions of the Site beyond plant properties. The term "off-site" has been mistakenly used at times to describe this area in documents in the Administrative Record. This Proposed Plan addresses only the Simplot OU.

**General Site Description:** The Site is located at the base of the northern slope of the Bannock Range, where it merges with the Snake River Plain. It extends southward into the Bannock Range foothills. The northern part borders the southeastern edge of the Michaud Flats. The eastern edge is approximately 2.5 miles northwest of Pocatello. The nearest residence is within ½ mile north of the plant properties.

The Site is located in Power County, bounded on the north by the Portneuf River and to the south by Bureau of Land Management (BLM) lands. Figure 3 shows the zoning in the vicinity of the Site.

**Geology and Hydrogeology:** Volcanic bedrock and coarse gravel underlay the Site. The general stratigraphy includes (from the bottom) volcanic bedrock units, coarse volcanic and quartzitic gravel, fine-grained sediments of the American Falls Lake Bed, the Michaud gravels, and calcareous silts and clays (Figure 4 is a schematic block diagram). The latter surface soils range in thickness from 10 to 40 feet and have an alkaline pH that neutralizes acidic solutions and precipitates metal salts. (Figure 5 shows hydrogeologic cross sections, Figures 6 and 7 show the east-west cross section across the plants).

Groundwater flows from the Bannock Range foothills toward the north/northeast through unconsolidated sediment overlying the volcanic bedrock. Figures 8 and 9 depict the ground water flow patterns at the plants. Shallow and deep aquifer zones, separated by confining strata, are present in the plant areas and to the north. Depths to water in the shallow aquifer range from 170 feet below ground surface in the Bannock Range area to 55 feet below ground surface in the Michaud Flats area. Shallow groundwater flows into the valley where it mixes with the more prolific Michaud Flats and Portneuf River systems. Groundwater within the deeper aquifer is either captured by Simplot production wells or continues northward where it flows upward to the shallow aquifer. The shallow groundwater and a significant portion of the deeper groundwater flowing under the plants discharges to the Portneuf River through Batiste Springs, Swanson Road Springs, and as base flow to the River in the reach between these springs.

**Hydrology (Surface Water):** The Portneuf River, which lies to the east and north of the plants, is the major surface water at the Site. South of Interstate 86, it is a losing stream. North of Interstate 86, it is a gaining stream fed by ground water base flow and a series of springs. The Portneuf River flows into the American Falls Reservoir. Figure 10 shows these major surface water features. Rainwater which falls or flows onto the plants is captured and controlled, there is no storm water runoff from the plants.

**Climate:** The Site is semi-arid, with approximately 11 inches of total precipitation per year. Net annual potential evapotranspiration rates in the area exceed annual precipitation. Prevailing winds are from the southwest, see Figure 11. There is also a secondary wind component out of the southeast which appears to be a drainage wind that flows out of the Portneuf River valley, primarily at night.

**Ecology:** The plants are industrial facilities and much of the land surface has been disturbed resulting in limited areas with vegetation. Major terrestrial vegetation cover types and wildlife habitats include agricultural, sagebrush steppe and wetland/riparian. Figure 12 shows the habitat and vegetation cover types. Wildlife habitats in the vicinity include: sagebrush steppe, grassland riparian, cliff and juniper. The most significant aquatic habitats in the vicinity are the Portneuf River and associated springs and riparian corridor and the Fort Hall Bottoms (a sacred Shoshone Bannock Tribes [SBT] site). These areas are designated wetlands under the National Wetland Inventory of the U.S.Fish and Wildlife Service. The Portneuf River supports an extensive riparian community, which is an important source of food, cover, and nesting sites for many wildlife species. Numerous migratory bird species use areas in and near the site by the thousands, particularly the Fort Hall Bottoms.

**Site Subareas:** During the Remedial Investigation/Feasibility Study (RI/FS) conducted during the 1990s, property outside the FMC and Simplot operational areas (beyond their fence lines) was described as “off-plant” or (inaccurately) as "off-site" ("off-site" is inaccurate because the Off-plant subarea is part of the Site). Site boundaries are fixed in RODs after the RI/FS is completed. They are defined by the "areal extent of contamination."  In the risk assessment and FS, adjacent FMC or Simplot-owned properties, some of which were acquired during the RI, were considered part of the plant and were not evaluated for either current or future residential use.  The FS, risk assessment and ROD refer to these areas as the FMC Subarea, Simplot Subarea, and Off-Plant (or Site) Subarea based on ownership.  Subareas have since become Operable Units (OUs).  This proposed plan uses the term OU.  Because this Proposed Plan only directly affects the Simplot OU, it is the only OU discussed in more detail below.

**Simplot OU:**  The Simplot OU is defined as those properties and operating facilities owned by the J.R. Simplot Company.  The main plant area is shown in detail in Figure 13.  The Don Plant area is the portion located to the south of the Union Pacific Railroad tracks which run parallel to Highway 30.  The Don Plant area includes all ore processing, byproduct and product handling, and byproduct and waste storage facilities.  The northern Simplot properties are all contiguous property owned by Simplot to the north of the Don Plant northern fence line.  The northern Simplot properties include ponds used to store and discharge various non-contact water streams and storm water from the Don Plant to permitted land application.  This water may undergo pH adjustment prior to distribution to land application if necessary.  The Portneuf River flows through the northeastern portion of the Simplot OU, but the ROD included it in the Off-Plant OU.  Remedial action within the Simplot OU to address Simplot sources to groundwater and the River are Simplot OU remedies, not Off-Plant OU remedies. The Simplot OU is not located within the Fort Hall Indian Reservation boundary.

The Simplot plant processes phosphate rock into phosphoric acid and other fertilizers.  The phosphate rock is ground and slurried at the mine and transported to the plant by pipeline where it is reacted with sulfuric acid to produce phosphoric acid and by-product gypsum (calcium sulfate).  The phosphoric acid is used to make various grades of fertilizer or is concentrated to produce stronger acids which are feedstocks to subsequent production lines.  Baghouses, scrubbers, and other systems are used to control air emissions.  The gypsum is slurried with water and transported to an unlined gypsum stack south of the processing facilities.  Other process effluent waters are collected and treated (pH adjustment) in a series of lined ponds.  The treated water is nutrient rich and sold for irrigation/fertilization.

**Suspected Causes of Contamination and Contaminated Media:**  As part of ongoing operations since the 1940's, the Don Plant has released COCs to soil and groundwater via the phosgypsum that has been deposited onto the pile to the south of the plant known as the gypsum stack or "gypstack".  The phosphogypsum is slurried and pumped to the gypstack.  Some of the water utilized to convey the gyp slurry percolates down through the stack to groundwater.  Groundwater beneath the gypstack and main plant area flows to the north and mixes with regional groundwater flow coming from the south and east resulting in a dilution of COCs in groundwater.  The affected groundwater and diluted contaminants eventually discharge to a series of springs along the banks of the Portneuf River and as underflow through the river bed.

**Summary of Previous Environmental Investigations:** The Site has been the subject of many historical investigations.  Appendix A of the 1996 RI Report provides a summary of the previous investigations in the vicinity.  1973 IDEQ groundwater sampling revealed levels of arsenic, lead, and cadmium above the Primary Federal Drinking Water Standards.  A 1977 U.S. Geologic Survey Environmental Impact Statement related to the development of phosphate resources in southeast Idaho detected elevated levels of phosphate in Batiste Spring attributed to Site sources.  Subsequent studies documented elevated levels of mercury, arsenic, and cadmium in Batiste Spring as well as phosphorus.  A 1987 EPA inspection of both plants concluded that underlying water-bearing intervals contained metals at concentrations exceeding Maximum Contaminant Levels (MCLs).  In pond, waste, and soil samples, EPA also found elevated levels of cadmium, chloride, total chromium, copper, fluoride, and selenium.  The RI Report remains the most comprehensive study to date of the Site.  More than 1,500 groundwater samples were taken which confirmed that COCs were released at the Site to the groundwater and were migrating to the Portneuf River.

**Record of Decision:** The ROD identified several COCs in soil, groundwater, and air, see Table 36 in the ROD.  Selected remedial actions for soil and air releases are unrelated to this Proposed Plan for a ROD Amendment.  The ROD also determined that COCs released from Site sources to groundwater were discharging to surface water in a series of springs and river underflow to the north.  Arsenic was found in groundwater in excess of the Maximum Contaminant Level (MCL) of the Safe Drinking Water Act, and the discharge point at the springs was identified in the ROD as the point of compliance.  The ROD recognized that other COCs in groundwater also required remediation but concluded that by capturing sufficient quantities of arsenic to meet the MCL at the point of compliance, sufficient quantities of other COCs, including orthophosphate, which were co-located in the groundwater, would be captured.  The selected remedy for the Simplot OU included design and installation of a groundwater extraction system combined with source control (improvements to the gypsum stack decant system) to reduce groundwater COC levels to MCLs or Risk Based Concentrations (RBC) with a performance standard of the MCL for arsenic at the discharge point at the springs.  The ROD also included the use of institutional controls to prevent the use of affected groundwater for drinking.  Operation and maintenance of the extraction system would continue until COCs in the groundwater throughout the Simplot OU are reduced below the MCLs or RBCs, or until EPA determines that continued groundwater extraction would not be expected to result in additional cost-effective reduction in contaminant concentrations within the Simplot OU.

**Remedial Design:** In 2002, following entry of a remedial design/remedial action Consent Decree in Idaho District Court, Simplot initiated the design for the groundwater extraction system selected in the ROD. Simplot had installed two extraction wells in the late 1990s and had begun groundwater extraction voluntarily at that time. In 2004, the first in a series of groundwater extraction wells were installed and began pumping. The approach for design and operation of the groundwater extraction system, most specifically to arrive at a necessary minimum pumping extraction rate to meet the MCL for arsenic at the points of compliance, has been and continues to be iterative. Toward this end, a variety of on ongoing quarterly, semiannual, annual, and special event groundwater monitoring campaigns have been conducted.

**Orthophosphate**: In 1999, IDEQ prepared a Water Body Assessment and TMDL for phosphorus for the Portneuf River. The TMDL, and Water Body Assessment and TMDL, concluded that the springs north of source areas of the Site (non-point sources) were responsible for the largest mass loading of phosphorus (in the form of orthophosphate) to the River, approximately 75 to 80 percent. In 2003, the Portneuf River TMDL Implementation Plan identified mass reduction goals for identified contributing sources, including an approximately 95% reduction for Site sources. In the Plan, including written contributions from identified sources, Simplot described meeting its first phase TMDL goal (i.e., reduction of approximately 80%) primarily by implementing the selected remedy in the ROD. Although the selected remedy was designed primarily to capture arsenic, co-located orthophosphate in the groundwater, in what EPA and Simplot believed would be sufficient quantities, was also anticipated to be captured. Phosphorus in any of its forms, including orthophosphate, was therefore not identified as a COC in the ROD with a specific performance standard. It has now become clear that the removal or containment of sufficient quantities of orthophosphate loading from Simplot sources cannot be accomplished by achieving the MCL for arsenic at the points of compliance as the ROD had concluded. EPA has therefore determined that augmentation of the selected remedy by the Preferred Alternative in this Proposed Plan is necessary to meet the phosphorus mass reduction goals and target concentration of 0.075 mg/L defined in the TMDL process to adequately address risks to aquatic receptors in the River posed by elevated orthophosphate levels which were not adequately addressed by the selected remedy.

**General Impacts of Orthophosphate on Rivers and Reservoirs:** Discharge of orthophosphate into a river can lead to excess growth of aquatic plants, such as periphyton (algae growing on rock surfaces), rooted and non-rooted macrophytes, and phytoplankton. In addition to creating a nuisance for recreational use of the river, the increased photosynthesis from the plant community can have a detrimental effect on water quality, particularly diel pH and dissolved oxygen (DO). Deterioration of water quality in turn has a detrimental effect on fish and other aquatic life inhabiting the water.

Phosphorus introduced to a river can be transported in the water column in both soluble and particulate forms. Soluble phosphorus is utilized for growth by floating and non-rooted macrophytes (e.g., epiphyton attached to rooted plants). Particulate phosphorus can settle to the river bed and support growth of rooted plants. The linkage between phosphorus-laden sediments and rooted macrophytes was the subject of a previous ecological risk assessment for the Snake River by EPA in 2002.

Parallel sampling of phosphorus, fish and macroinvertebrates at a large ecoregion scale provides empirical evidence that elevated phosphorus is an indirect stressor on aquatic life. EPA's EMAP program has collected parallel samples from a large number of water bodies from arid regions of the western United States. The data indicate that waters with poor (elevated) phosphorus concentrations are more likely to have poor fish and macroinvertebrate communities.

**Specific Impacts Seen in the Portneuf River:** Phosphorus concentrations in the Portneuf River, downstream of the groundwater plume confluence, are over 10 times higher than TMDL targets established to control eutrophication.

The range of diel DO concentrations increases markedly between Batiste Road and Siphon Road with the increase in orthophosphate concentrations. The minimum daily DO concentration drops as much as 3 mg/l downstream of the Simplot plume confluence with the Portneuf River, and it drops below the Idaho water quality standard (6 mg/l) in the early morning hours in late summer.

Downstream of Batiste Road, the macrophyte biomass increases by two orders of magnitude, and this part of the river exhibits low macroinvertebrate diversity, consistent with water quality and habitat degradation associated with nutrients and other stressors.

Phosphorus levels in the Portneuf River are sufficient to contribute significantly to water quality and habitat degradation in the American Falls Reservoir due to excessive blue-green algal growth and associated reductions in hypolimnetic dissolved oxygen. Despite contributing less than 6% of the average annual inflow to American Falls Reservoir, the Portneuf River contributes approximately two-thirds of the total phosphorus load to the reservoir in an average flow year.

The substantial risks of these ecological effects, the morbidity, mortality, reproduction and growth effects on various biota in the River, were the bases for the establishment of the TMDL for phosphorus loading of the River, and are the bases for the need to select the Preferred Alternative in this Proposed Plan.

**Summary of Remedial Action to Date:** Simplot completed the installation and testing of a pilot test extraction system from 2003 to 2004 and began operation of ten test extraction wells in June 2004. In May 2005 Simplot began an interactive process of revising the design of the groundwater extraction system. This process involved integrating more recent EPA guidance such as *A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems* (in draft form during the process and published in January 2008; EPA 2008). This extraction system was developed to capture arsenic contaminated groundwater. The addition of phosphorus as a COC may require further augmentation of the groundwater extraction system. In addition, source control of phosphate loading to groundwater from the gypstack and the phosphoric acid plant will be required.

**Summary of Public Involvement Activities Regarding the EMF Superfund Site:** EPA regularly prepares fact sheets and newsletters about the EMF site to update the public. In addition, public meetings are periodically held to provide information to the public and to solicit input regarding Site progress. The most recent public meetings were in Pocatello and Fort Hall in July 2008. The public is invited to comment in writing and to attend the public meeting regarding this Proposed Plan, as stated above. More information regarding public involvement activities can be found at:

http://yosemite.epa.gov/R10/cleanup.nsf/sites/emichaud/

## SITE CHARACTERISTICS

**Physical Site Characteristics:** The Simplot OU covers approximately 1025 acres, and adjoins the eastern property boundary of the FMC facility (see Figure 2). The main portion of the plant lies approximately 500 feet southwest of the Portneuf River. Currently, the plant produces 12 principal products, including solid and liquid fertilizers.

Ongoing plant operations require continuous pumping of gypsum slurry from the main plant area to the top of the gypstack. Some of the process water used to convey the slurry percolates down through the gypstack where it eventually flows into a shallow and a deep aquifer system that lie beneath the gypstack. In the main plant area, releases have also contaminated groundwater with arsenic and phosphoric acid which becomes orthophosphate by the time groundwater discharges to the River. The contaminated groundwater from the gypstack and plant area comingle and mix while flowing north where the flow is combined with additional regional flow from the south and east. The overall effect is a dilution of COCs in the groundwater. The groundwater eventually discharges to the Portneuf River in the vicinity of Batiste Springs.

**Nature and Extent of Groundwater Contamination**: Simplot conducts quarterly groundwater quality monitoring at approximately 72 well and spring locations. While a variety of COCs are monitored, this Proposed Plan specifically addresses arsenic and phosphorus/orthophosphate levels. The conclusion in the ROD that meeting the MCL for arsenic at the points of compliance would address exceedances of other COCs (other than orthophosphate) remains valid. For reference, levels of arsenic in uncontaminated wells in the Pocatello area are generally less than 10 µg/L (IDEQ Ground Water Technical Report 23 [2004]) . The 1996 RI Report (Bechtel 1996) found levels of phosphorus in uncontaminated wells in the Pocatello area are generally less than .050 mg/L. The 3rd quarter 2008 groundwater monitoring results (Newfields 2008) are the latest available. The 3rd quarter reported identified levels of arsenic at the Site were as high as 814 µg/L (Well 340), and levels of phosphorus were as high as 5,200 mg/L (Well 340). The 2007 Annual Report (Newfields 2007) provides the most recent available annual summary (summarizing 4 years of data). Results for the 3rd quarter 2008 (overall range of results) and the 2004 to 2007 data (results for Batiste Springs only) are summarized in the table below. The highest levels of contaminants were generally found south of Highway 30 and generally became more dilute as groundwater flowed to the north and discharged to the Portneuf River in the vicinity of Batiste Springs. However, localized hotspots are found within the facility boundaries. An even more recent sample result from a sampled collected on January 28, 2009 from plant well 419 reported a phosphorus level of 13,224 mg/L. It is incontrovertible that the extent of contamination extends into the Portneuf River above the TMDL.

| Date | Arsenic (µg/L) | Phosphorus (mg/L) |
|---|---|---|
| January 28, 2009 (well 419 Spill Report) | | 13,224 |
| 3rd Quarter 2008 (All Sample Points) | 3 –814 | 0.01 – 5,200 |
| 2007 Annual Report (Batiste Springs) | 5 –37 | 2 – 48 |
| Typical Pocatello Area Background | < 10 | <0.05 |

Figure 14 presents the general arsenic concentrations in groundwater for the study area and Figure 15 presents the general phosphorus concentrations in groundwater for the study area. Figure 16 presents the maximum arsenic concentrations measured during January 2009. Figure 17 presents the maximum phosphorus concentrations measured during January 2009.

## SCOPE AND ROLE OF THE PROPOSED RESPONSE ACTION

The Preferred Alternative is necessary to reduce risks to ecological receptors in the Portneuf River (and American Falls Reservoir) by reducing or eliminating phosphorus/orthophosphate loading of groundwater discharging to the River. This will be accomplished by a combination of source control to reduce or eliminate loading and groundwater extraction to the extent necessary to meet both the MCL for arsenic and the RBC for phosphorus/orthophosphate at their respective points of compliance. While the TMDL has provided both compelling bases for further remedial action and a numerical goal for that action, specific RBCs for orthophosphate for ecological (and human) receptors in groundwater and surface water (essentially a fine tuning of the TMDL value for ecological receptors and a much less stringent value for potential human receptors) will be developed. For groundwater, two RBC levels will be developed: (1) a human-health level based on use of groundwater as drinking water, which applies to the entire site; and (2) a level that applies only to the area where groundwater discharges to surface water and is back-calculated based on meeting the surface water RBC at the defined point of compliance in surface water.

To the extent that source control effectively reduces phosphorus loading, additional groundwater extraction to ultimately meet the RBC for phosphorus should decrease proportionately. The two major source control components of the Preferred Alternative are the implementation of source control plans to be approved by EPA for releases of COCs in the vicinity of the phosphoric acid plant, and installation of a high-density polyethylene (HDPE) liner on top of the gypstack to significantly reduce the infiltration of process water into underlying groundwater. See the descriptions of the Preferred Alternative, also called Alternative 3, following the comparison of alternatives, for a further description.

The currently operating groundwater extraction system selected in the ROD was designed primarily to meet the MCL for arsenic. This system will be re-evaluated and modified as necessary to optimize the extraction of groundwater to meet cleanup levels for both arsenic and phosphorus. This may require the installation of additional groundwater extraction wells and an increase in the groundwater extraction rate, depending in significant part on the effectiveness of source control measures.

## SUMMARY OF SITE RISKS

Although several COCs have been detected in groundwater beneath the Simplot OU, meeting cleanup levels for arsenic and phosphorus/orthophosphate in groundwater at their respective points of compliance will sufficiently reduce or eliminate risks to human health and the environment from all other COCs. Risks to human health and the environment due to COCs in other media (e.g., soil or air) are not part of the action addressed in this Proposed Plan.

Human health risks posed by arsenic in groundwater are primarily associated with ingestion of drinking water. Although if found at high enough concentrations phosphorus can be a risk to human health, risks posed by phosphorus are primarily associated with excessive nutrient loading of surface water resulting in significant alteration or loss of ecological habitat and the decline of various species. The concentration of arsenic in groundwater in the Don Plant portion of the Simplot OU was as high as 814 µg/L during the 3$^{rd}$ quarter of 2008 (the MCL is 10 µg/L). After dilution and attenuation in groundwater, arsenic levels in water discharging to the Portneuf River have recently been as high as 37 µg/L. The concentration of orthophosphate in groundwater was as high as 5,200 mg/L during the 3$^{rd}$ quarter of 2008. After dilution in groundwater, orthophosphate levels in water discharging to the Portneuf River have recently been as high as 48 mg/L. While there is no MCL or other regulatory standard for orthophosphate in groundwater or surface water, the Portneuf River TMDL set a target total phosphorus criterion of 0.075 mg/L.

## REMEDIAL ACTION OBJECTIVES

The Preferred Alternative in this Proposed Plan (or Alternative 3 below) is necessary to protect the ecological receptors in the Portneuf River (and American Falls Reservoir). Further, Section 121(d)(2)(A)(ii) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (last sentence) requires that remedial action selected by EPA “shall require a level or standard of control which at least attains MCLs and water quality criteria established under section 303 or 304 of the Clean Water Act (citations omitted), where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release.” With respect to groundwater, if it is potable, i.e., suitable for drinking in its natural state, MCLs are relevant and appropriate.

The Remedial Action Objectives (RAOs) for this ROD Amendment (RODA) are to:

- Reduce the release and migration of COCs to surface water from facility sources that result in concentrations exceeding RBCs or chemical specific Applicable or Relevant and Appropriate Requirements (ARARs), including water quality criteria (WQC) pursuant to the Clean Water Act;
- Achieve source control for the existing gypsum stack and phosphoric acid plant area within the shortest practicable timeframe.

These RAOs are in addition to those in the ROD. An important change since the ROD is that the MCL for arsenic cited in Table 36 of the ROD has been lowered from 50 ug/l to10 ug/l.

## SUMMARY OF REMEDIAL ALTERNATIVES

EPA considered three groundwater remedial alternatives. The Preferred Alternative will comply with all ARARs, and will in any case achieve "a level or standard of control which at least attains MCLs and water quality criteria established under section 303 or 304 of the Clean Water Act (citations omitted), where such goals or criteria are relevant and appropriate under the circumstances of the release or threatened release," in accordance with Section 121(d)(2)(A)(ii) of CERCLA.

MCLs may be found at 40 CFR Part 141 (Safe Drinking Water Act regulations). See 40 CFR Part 131 for federal Clean Water Act Water Quality Criteria (WQC). MCLs are relevant and appropriate for potable groundwater or surface water. WQC are surface water standards for CERCLA remedial action. Idaho Water Quality Standards (WQS) are ARARs that must also be met. Generally, CERCLA cleanups have to meet the stricter of federal WQC and state WQS. Based on criteria in Section 121(d)(2)(B)(i) of CERCLA, Idaho WQS may completely replace federal WQC for specific COCs and/or specific water bodies. Idaho's Antidegredation Policy (IDAPA Section 16.01.02.051), which requires that existing water uses and water quality be maintained and protected, is also an ARAR.

Based on information currently available, EPA's Preferred Alternative is Alternative 3. During the upcoming public comment period for this Proposed Plan, EPA welcomes and encourages public comment on the Preferred Alternative, the other evaluated alternatives, and on any other ideas or approaches.

**Description of the Remedial Alternatives Considered for this Action:** The remedial alternatives considered for this groundwater remedial action are presented below. The key features, capital costs and costs of operation and maintenance for a period of 15 years are summarized for each alternative in Table 1.

**Alternative 1 – No Action.** Evaluation of a no action alternative is required as a basis for comparison with other alternatives. No further remedial action would be required or implemented to address risks from phosphorus/orthophosphate releases not adequately addressed by the ROD. Concentrations of phosphorus/orthophosphate would be addressed only to the extent they are addressed by the current extraction system to meet the MCL for arsenic at the OU boundary. RAOs related to phosphorus/orthophosphate loading would not be achieved. Risks to ecological receptors in the Portneuf River from elevated orthophosphate levels would not be adequately addressed.

**Alternative 2 – Groundwater Extraction and Treatment.** This alternative would require installation of a greatly enhanced network of groundwater extraction wells to pump groundwater at a rate that would allow sufficient extraction of phosphorus/orthophosphate (as well as arsenic) to meet the RBC at the points of compliance despite the current mass loading rate. Extracted contaminated groundwater would have to be used within the operating plant to the extent possible with the excess treated and then discharged to the Portneuf River pursuant to effluent limitations required by the Clean Water Act for point source discharges. EPA estimates the extraction rate would be approximately 6,500 gallons per minute (gpm), with a 1,500 gpm maximum capacity for reuse within the plant, leaving approximately 5,000 gpm for treatment and discharge. This would require a wastewater treatment plant with a 7.2 million gallon/day (MGD) capacity. Alternative 2 would meet RAOs although COC loading at the primary source areas would not be diminished and costs would be very high. The estimated amount of time required to meet the RAOs is 15 years.

**Alternative 3 – Source Control and Groundwater Extraction**. This alternative would utilize a combination of two techniques to meet to the RBC for phosphorus/orthophosphate (along with the MCL for arsenic) at the point of compliance. First, reductions in source loading to groundwater would be accomplished by investigating and then addressing sources of releases within the phosphoric acid plant area, and by the addition of a liner and drainage system on top of the gypstack to reduce migration down through the gypstack to groundwater. The liner and drainage system would be accomplished in three separate phases. Phase 1 would comprise lining the smallest, lower level of the gypstack and constructing a decant pond for the water drained from the gypstack. Phases 2 and 3 would be to line the west and east portions of the upper gypstack to complete the long-term source reduction of contaminants to groundwater from the stack. Second, the existing extraction system would be enhanced only to the extent necessary to meet the RBC for phosphorus/orthophosphate (along with the MCL for arsenic) given what should be substantially reduced loading. All extracted water would be reused in the ongoing manufacturing processes to the extent possible. Alternative 3 would meet RAOs, COC loading at the primary source areas would be diminished and costs would be much less. The estimated amount of time required to meet the RAOs is 15 years.

**Discussion and Summary of Distinguishing Features of Each Alternative:** Distinguishing features between the remedial alternatives are discussed in the following paragraphs.

- RAOs cannot be met by Alternative 1. RAOs should be met by Alternatives 2 or 3 though it is not clear which would achieve RAOs more quickly. Alternative 2 utilizes a higher pumping rate but requires design and construction of more infrastructure including a treatment plant with much greater pumping capacity. Alternative 3 requires a substantially smaller and less complex extraction system, but requires gypstack liner design and installation, with phosphoric acid plant area source control implemented contemporaneously.
- The estimated volume of media addressed for Alternative 1 is zero. Alternative 2 would extract approximately 6,500 gpm of groundwater, 5,000 gpm of which would require treatment and discharge. Alternative 3 is estimated to extract approximately 1,500 gpm which should require little or no treatment and discharge.
- Alternative 1 has no implementation requirements. Alternative 2 would require a significant redesign of the existing groundwater extraction system, and the design and construction of a 7.2 MGD wastewater treatment plant. Alternative 3 would require a moderate re-design of the existing groundwater extraction system, source control measures within the phosphoric acid plant area, and installation of a liner and drainage system for the gypstack.
- While future Simplot OU land use is expected to remain industrial, with the plant currently projected to remain operational indefinitely, Alternatives 2 and 3 would result in fewer land use limitations in the event of plant closure, and are consistent with the remedy selection for the Site. Alternatives 2 and 3 will reduce the migration of COCs in groundwater to the Portneuf River to acceptable levels.
- Alternative 1 utilizes neither presumptive remedies nor innovative technology. Alternative 2 utilizes innovative technology. Alternative 3 utilizes a presumptive remedy and innovative technology.
- No time is required to implement Alternative 1. Construction activities for Alternative 2 and 3 could be completed within 5 years, with some uncertainties related to design criteria.
- Alternative 1 has no implementation costs. The estimated capital cost for Alternative 2 is $16,026,017, with a fifteen-year annual operation and maintenance (O&M) cost estimated at $23,671,520/year. The net present value for Alternative 2 is $261,728,300. Estimated capital cost for Alternative 3 is $48,000,000 with a fifteen-year annual O&M cost estimated at $247,712/year. The net present value for Alternative 3 is $50,571,166.

The key features of each of these alternatives are summarized in the Table 1 below.

**TABLE 1**

**Key Features, Capital Costs and Costs of Operation and Maintenance Of Alternatives**

| Alternative | Meet RAOs? (Y/N) | Time to Implement (Years) | Capital Costs ($) | Operation Costs ($/yr) | Net Present Value ($) |
|---|---|---|---|---|---|
| 1 | N | 0 | 0 | 0 | 0 |
| 2 | Y | 15 | $16,026,017 | $23,671,520 | $261,728,300 |
| 3 | Y | 15 | $48,000,000 | $247,712 | $50,571,166 |

## EVALUATION OF ALTERNATIVES

Remedial alternatives are compared using nine criteria in the NCP as derived from CERCLA. These criteria are in three categories; threshold criteria, primary balancing criteria, and modifying criteria.

- **Threshold criteria** must be met by an alternative for it to be eligible for selection.
- **Primary balancing criteria** are used to weigh major trade-offs among eligible alternatives.
- **Modifying criteria** by their nature are most often considered after comment on the Proposed Plan.

This section summarizes each alternative against the nine criteria which are used to evaluate the different alternatives individually and against each other to select a remedy.

### Threshold Criteria

***1. Overall Protection of Human Health and Environment***

**Alternative 1 – No Action:** This alternative is not protective of the environment due to continued mass loading of phosphorus/orthophosphate into surface water.

**Alternative 2 - Groundwater Extraction and Treatment:** Successful implementation of this alternative should be fully protective. Arsenic and phosphorus levels should meet MCLs and RBCs.

**Alternative 3 – Source Control and Groundwater Extraction:** Successful implementation of this alternative should be fully protective. Arsenic and phosphorus levels should meet MCLs and RBCs.

***2. Compliance with ARARs***

**Alternative 1 – No Action:** This alternative leaving the current extraction system in place does comply with ARARs, though not with necessary phosphorus loading reductions. TMDL targets are technically not ARARs because of the way they are created by the State, they are criteria To Be Considered (TBC).

**Alternative 2 - Groundwater Extraction and Treatment:** This alternative complies with ARARs.

**Alternative 3 – Source Control and Groundwater Extraction:** This alternative complies with ARARs.

<u>**Balancing Criteria**</u>

***3. Long-Term Effectiveness and Permanence***

Alternative 1 will not satisfy this criterion. It would never be effective.

Alternative 2 will require substantially greater groundwater extraction and discharge for as long as the plant remains operational, and thereafter. Alternative 3 may obviate the need for any post-extraction treatment for as long as the plant can utilize the projected 1,500 gpm of extracted groundwater in plant processes. Whatever extraction may be required following plant closure should be substantially less that that required by Alternative 2 given the reduced loading from source control implementation, and further reduced loading from the cessation of operations. It is possible following source control implementation that the extraction rate could be below current extraction rate projections. Alternative 3 provides greater long-term effectiveness and permanence than Alternative 2.

***4 Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment***

Alternative 1 will not reduce the toxicity, mobility, or volume of contaminants.

Alternatives 2 and 3 reduce toxicity, mobility, and volume of COCs through groundwater treatment. Alternative 2 should reduce a greater volume by treating a greater quantity of groundwater, however. Alternative 3 also reduces volume through source control measures. Since both of these alternatives have to achieve similar ultimate reductions in the Portneuf River as measured by the point of compliance in the groundwater, both alternatives should ultimately reduce a similar volume.

***5. Short-Term Effectiveness***

Alternative 1 will not satisfy this criterion. It would never be effective.

Alternatives 2 and 3 could provide similar short-term effectiveness. EPA projects approximately 3 years to implement either alternative, though Alternative 3 is projected to be the more likely to be implemented sooner. Alternative 3 could provide a significantly higher level of short-term effectiveness if some highly effective source control measures can be implemented quickly. Modest loading reductions are anticipated through the current extraction system. For these reasons, COC levels in groundwater are likely to drop comparatively more quickly by implementing Alternative 3 rather than Alternative 2.

***6. Implementability***

Alternative 1 presents nothing to implement.

The upgraded groundwater extraction system proposed for Alternative 2 is moderately easy to design and install. However, design, construction, and operation of a 7.2 MGD wastewater treatment plant for phosphorus/orthophosphate may prove significantly challenging. Most treatment technologies are designed to remove low levels of phosphorus (<10 mg/L) from wastewater. A pilot study would likely be required to confirm the effectiveness of alternative designs for phosphorus removal from extracted water.

The source control measures proposed under Alternative 3 are comparatively easy to install and operate. The HDPE liner for the gypstack is a standard technology to prevent water infiltration though site-specific conditions could add complications. Source control in the phosphoric acid plant area will likely include an upgrading of aging infrastructure and/or equipment, implementation of better practices to eliminate future releases, and physical removal of residual historical spills, tanks or other phosphorus sources as may be discovered during a thorough investigation. The upgraded groundwater extraction system will be smaller and less complex than the upgrade necessary for Alternative 2. It should be moderately easy to design and install. Alternative 3 offers significantly enhanced implementability over Alternative 2.

***7. Costs***

There are no costs associated with Alternative 1.

Alternative 2 has an estimated Net Present Value of $261,728,300 for a 15 year operating lifetime.

Alternative 3 has an estimated Net Present Value of $50,571,166 for a 15 year operating lifetime.

**Modifying Criteria**

***8. State Acceptance***

IDEQ, and the Shoshone Bannock Tribes support Alternative 3. Both expressed concerns particularly regarding the implementability of Alternative 2.

***9. Community Acceptance***

Community acceptance of the Preferred Alternative will be evaluated after the public comment period for this Proposed Plan. The input from public meetings and written comments will be carefully reviewed and a responsiveness summary will be prepared. This summary will be presented in the ROD Amendment for the Simplot OU, along with the selected remedy. A form for submitting comments is attached in the Appendix.

**PREFERRED ALTERNATIVE**

After careful analysis and consideration, Alternative 3, Source Control and Groundwater Extraction, has been chosen as the Preferred Alternative. Sources of historical and ongoing primary and secondary releases of phosphorus/orthophosphate at or near the phosphoric acid plant area will be identified and remedial measures would be taken to eliminate or reduce them to the extent practicable. A liner and drainage system would be installed on top of the gypstack to reduce the levels of COCs migrating down through the gypstack to groundwater. The existing groundwater extraction system will be re-evaluated to capture sufficient quantities of phosphorus/orthophosphate and arsenic to meet the MCL for arsenic and RBC for phosphorus/orthophosphate at their respective points of compliance. The point of compliance for phosphorus/orthophosphate in groundwater and surface water will be defined when the RBCs are determined. The extraction system will be modified as needed as it is implemented to meet the RAOs described above. This extraction system is expected to operate through plant closure at which time long-term groundwater restoration is anticipated to be evaluated.

Alternative 3 is recommended because it will achieve substantially greater long-term and short-term effectiveness and permanence; has substantially enhanced implementability at least as quickly (more likely sooner); at much lower cost than Alternative 2, while fully meeting the threshold criteria for all CERCLA remedies. It will achieve risk reduction by employing source control that will reduce mass loading of COCs to groundwater and will employ groundwater extraction to reduce the migration of COCs exceeding MCLs or RBCs to surface water. In addition, EPA believes Alternative 3 has a higher probability of success than Alternative 2 and provides the best balance of trade-offs among the alternatives. Alternative 1 does not meet the threshold criteria and is not eligible for selection.

The Preferred Alternative satisfies the statutory requirements of CERCLA Section 121(b). It is: (1) protective of human health and the environment; (2) complies with ARARs; (3) is cost-effective; (4) utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and (5) satisfies the preference for treatment as the principle element, or explains why the preference is not employed to the extent that it is not. It will effectively satisfy the RAOs. The Preferred Alternative may be modified or replaced based on new information or public comments. The public is vigorously encouraged to review and comment on this Proposed Plan.

## COMMUNITY PARTICIPATION

EPA provides information regarding the cleanup of the EMF Superfund Site to the public through newsletters, public meetings, the Administrative Record for the Site, direct mailings, announcements published in the *Idaho State Journal,* and through its website which may be accessed at:

http://yosemite.epa.gov/R10/cleanup.nsf/sites/emichaud

EPA and IDEQ encourage the public to gain a more comprehensive understanding of the Site and CERCLA activities currently in progress. Details about the public meeting and instructions for providing public comment on this Proposed Plan were provided on the first page. The Appendix contains a blank comment form to facilitate comment. For additional information on this project, please contact:

Ms. Kira Lynch
US EPA Region 10
1200 Sixth Ave., Suite 900
Office of Environmental Cleanup, ECL-113
Seattle, WA 98101
(T) 206-553-2144
(F) 206-553-0124
lynch.kira@epa.gov (For emailed comments, please put "Simplot ROD Amendment" in the subject line.)

Documents referred to in this Proposed Plan may be found in the Administrative Record, which is available for public review at the following locations:

**Idaho State University Library**
Government Documents
850 South 9th Avenue
Pocatello, Idaho 83209
(208) 282-3152

**Shoshone-Bannock Library**
Tribal Business Center
Pima Drive and Bannock Avenue
Fort Hall, Idaho 83203
(208) 478-3882

**EPA Region 10 Superfund Records Center**
1200 Sixth Avenue, Suite 900, ECL-076 (7th Floor)
Seattle, WA 98101
(206) 553-4494

303-739-6600

References

Adkins K (2009) Accidental Spill/Release Report p 6. Pocatello, ID: J.R. Simplot Company Agribusiness

Idaho Department of Environmental Quality PRO (1999) Porteneuf River TMDL Water Body Assessment and Total Maximum Daily Load p 239. Pocatello, ID http://www.deq.state.id.us/water/data_reports/surface_water/tmdls/portneuf_river/portneuf_river_entire.pdf

Idaho Department of Environmental Quality Ground Water Technical Report 23 (2004), Preliminary Evaluations of Arsenic Detections in Ground Water: A County-Level Arsenic Review, Appendix B

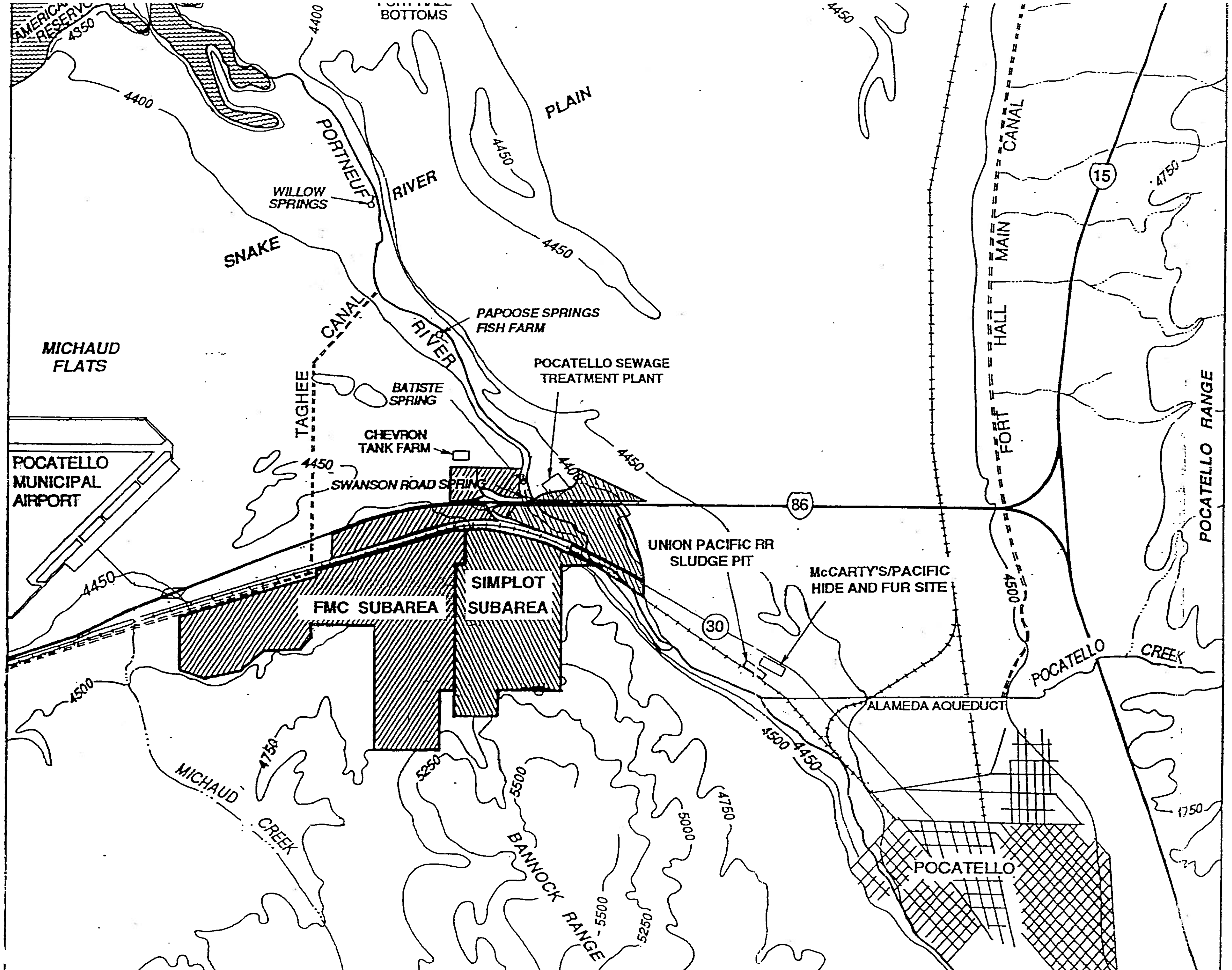
Bechtel (1996) Remedial Investigation Report For the Eastern Michaud Flats Site

Newfields (2008), Third Quarter 2008 Groundwater Monitoring Report, Simplot Plant Area, Eastern Michaud Flats Superfund Site, Appendix 1

## List of Acronyms Used in the Proposed Plan

| | |
|---|---|
| ARAR | Applicable or Relevant and Appropriate Requirements |
| CERCLA | Comprehensive Environmental Response Compensation and Liability Act (The Superfund Law) |
| COC | Contaminant of Concern |
| CWA | Clean Water Act |
| DO | Dissolved Oxygen |
| EMAP | Environmental Monitoring and Assessment Program |
| EMF | Eastern Michaud Flats (superfund site) |
| EPA | Environmental Protection Agency |
| gpm | gallons per minute |
| HDPE | High Density Polyethylene |
| IDAPA | Idaho Administrative Procedures Act |
| IDEQ | Idaho Department of Environmental Protection |
| MCL | Maximum Contaminant Level |
| ug/L | micrograms per liter |
| mg/L | milligrams per liter |
| MGD | million gallons per day |
| NCP | National Contingency Plan |
| OU | Operable Unit |
| O&M | Operations and Maintenance |
| RAO | Remedial Action Objective |
| RBC | Risk Based Concentration |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| RODA | Record of Decision Amendment |
| RPM | Remedial Project Manager |
| SBT | Shoshone Bannock Tribes |
| TMDL | Total Maximum Daily Load |
| WQC | Water Quality Criteria |
| WQS | Water Quality Standard |

# FIGURES




**EXPLANATION**

- RIVER
- INTERMITTENT STREAM
- SPRING
- TOPOGRAPHIC CONTOUR
- UNION PACIFIC RAILROAD
- CANAL
- EMF PROPERTY LINES

Contour Intervals
Above 4500 ft. elevation: 250 ft.
Below 4500 ft elevation: 50 ft.

Note:
Base map adapted from Trimble, 197
and from USGS Michaud (1971) and Pocatello North (1971) 7.5 minute topographic quadrangles.

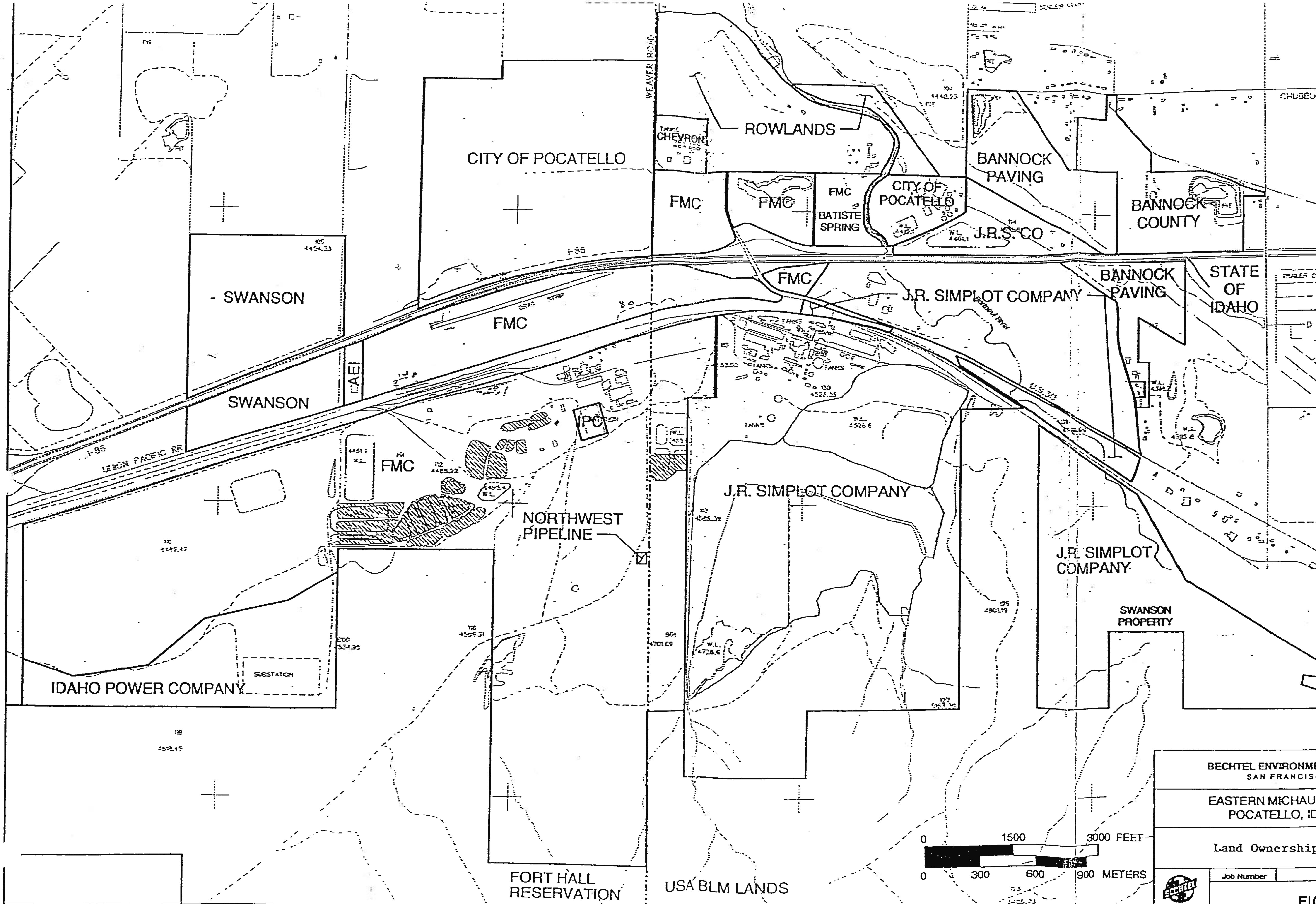
0 1
SCALE IN MILES

EASTERN MICHAUD FLAT
POCATELLO, IDAHO

FEASIBILITY STUDY

REGIONAL SETTING

FIGURE 1




BECHTEL ENVIRONMENTAL, INC.
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EASTERN MICHAUD FLATS
POCATELLO, IDAHO

Land Ownership

| Job Number | Drawing No. | Rev |
| --- | --- | --- |
| | | |

FIGURE 2

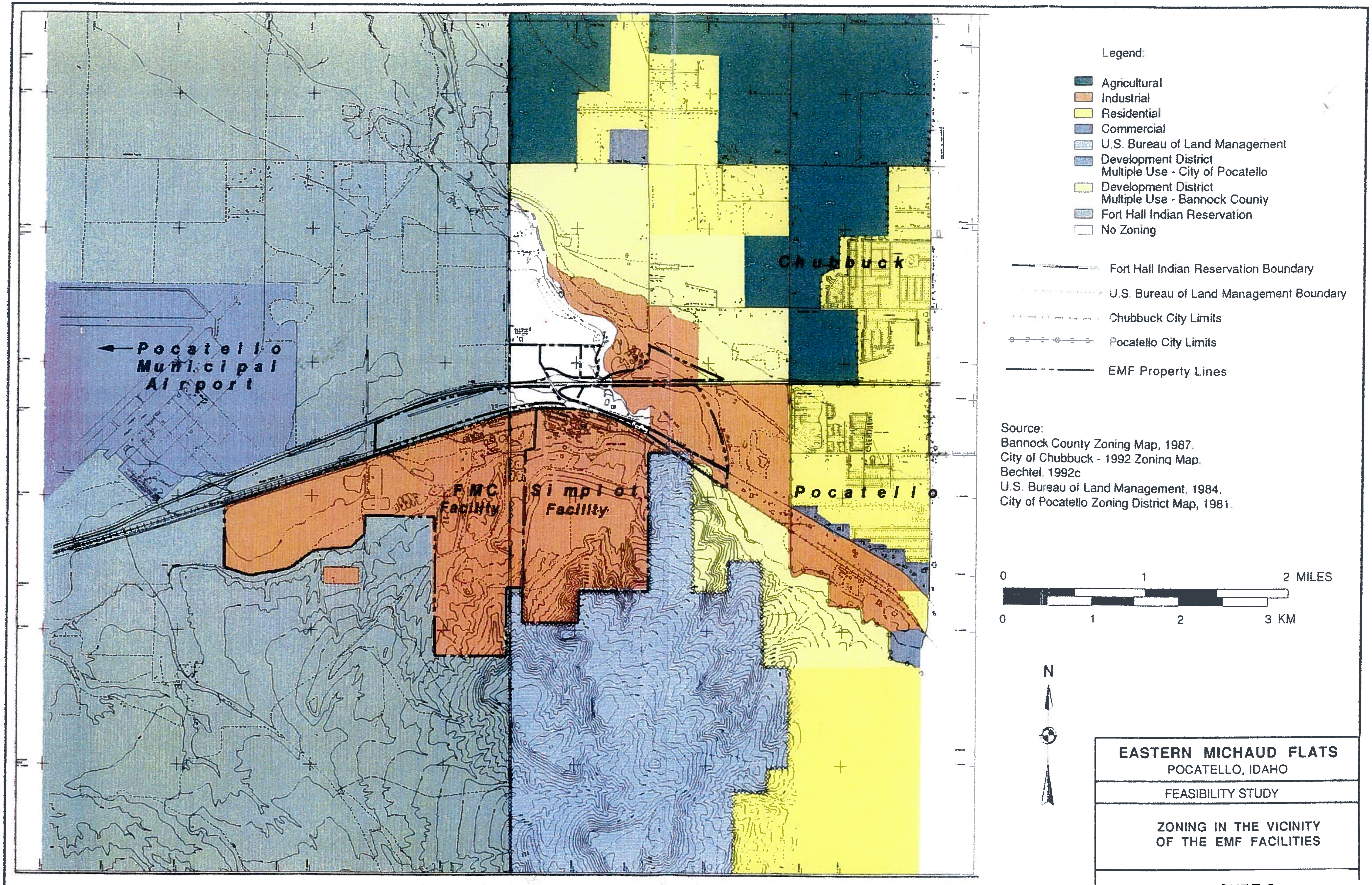
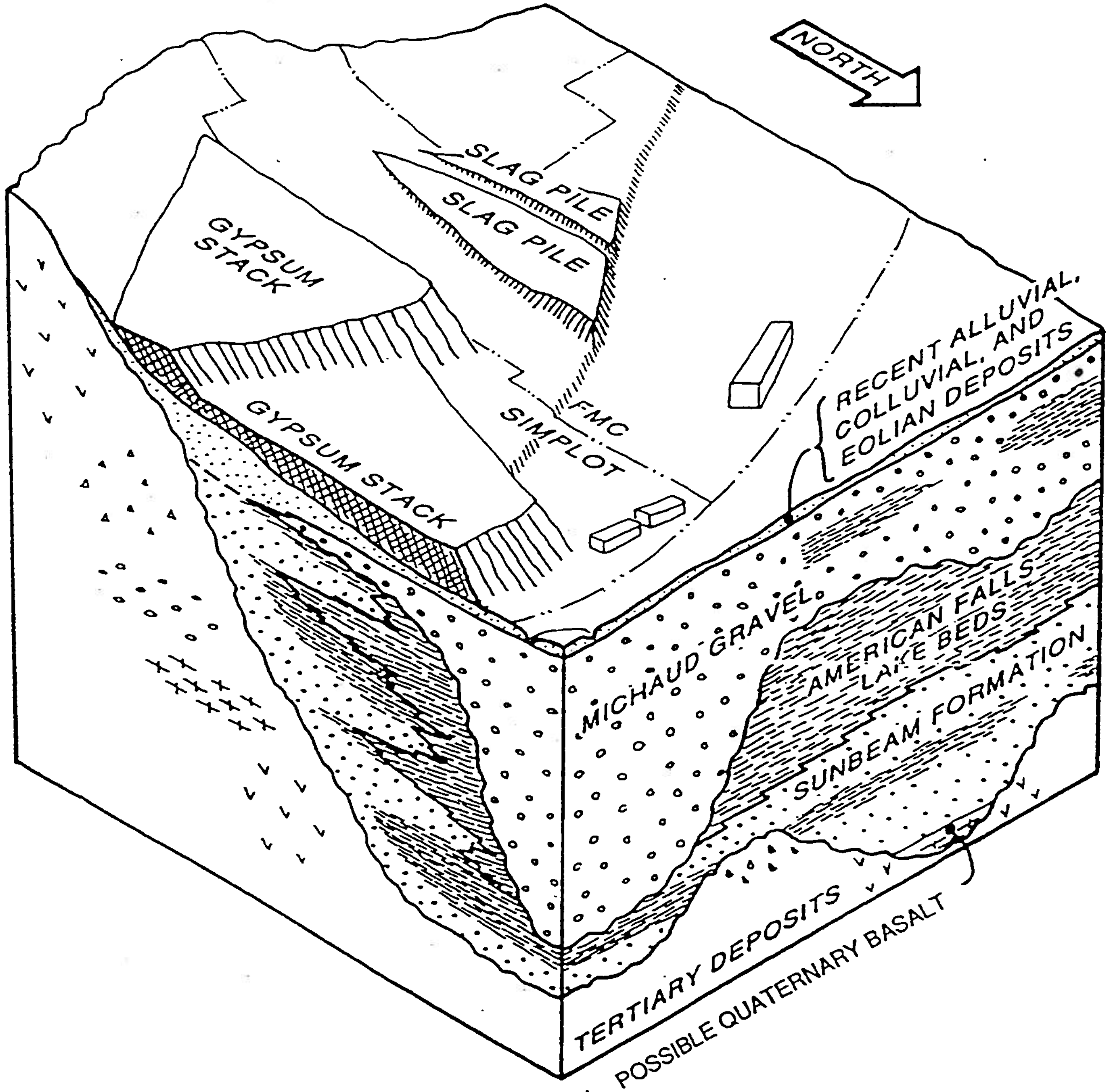

Pocatello Municipal Airport
FMC Facility
Simplot Facility
Chubbuck
Pocatello
Legend:
Agricultural
Industrial
Residential
Commercial
U.S. Bureau of Land Management
Development District Multiple Use - City of Pocatello
Development District Multiple Use - Bannock County
Fort Hall Indian Reservation
No Zoning
Fort Hall Indian Reservation Boundary
U.S. Bureau of Land Management Boundary
Chubbuck City Limits
Pocatello City Limits
EMF Property Lines
Source:
Bannock County Zoning Map, 1987.
City of Chubbuck - 1992 Zoning Map.
Bechtel, 1992c
U.S. Bureau of Land Management, 1984.
City of Pocatello Zoning District Map, 1981.
0 1 2 MILES
0 1 2 3 KM
N
EASTERN MICHAUD FLATS
POCATELLO, IDAHO
FEASIBILITY STUDY
ZONING IN THE VICINITY OF THE EMF FACILITIES

FIGURE 3




EXPLANATION

FACILITY BUILDINGS

FACILITY PROPERTY BOUNDARIES

PORTNEUF RIVER

NOT TO SCALE

SIDES OF BLOCK REPRESENT APPROXIMATELY 8000 FEET

HEIGHT OF BLOCK REPRESENTS APPROXIMATELY 400 FEET

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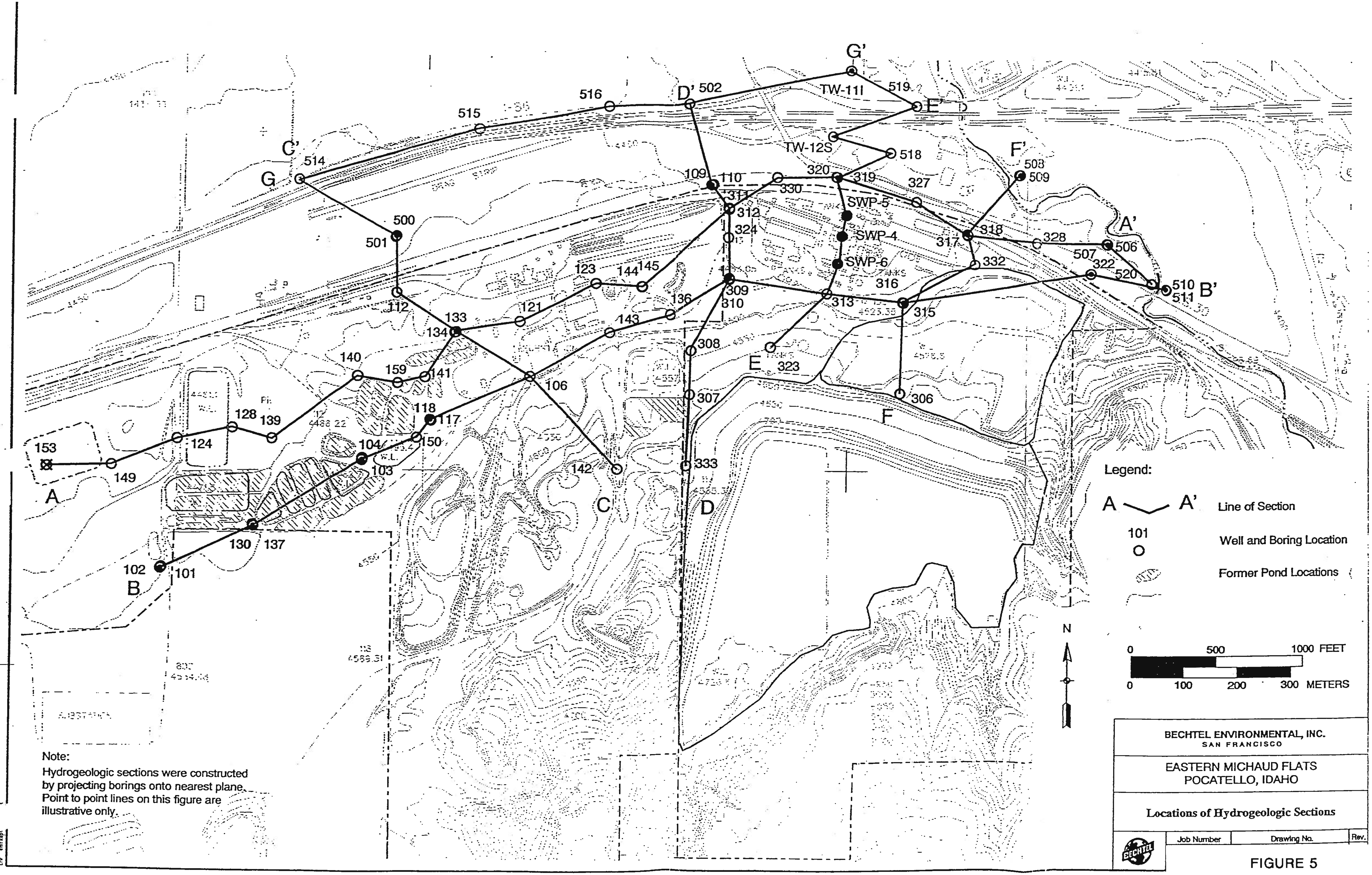
EASTERN MICHAUD FLATS
POCATELLO, IDAHO

**Schematic Block Diagram Showing Stratigraphic Setting at EMF Facilitie**

| JOB No. | DRAWING NO. | REV. |
|---|---|---|
| | | |

FIGURE 4


Legend:
A A' Line of Section
101 Well and Boring Location
Former Pond Locations
0 500 1000 FEET
0 100 200 300 METERS
N
Note:
Hydrogeologic sections were constructed by projecting borings onto nearest plane. Point to point lines on this figure are illustrative only.
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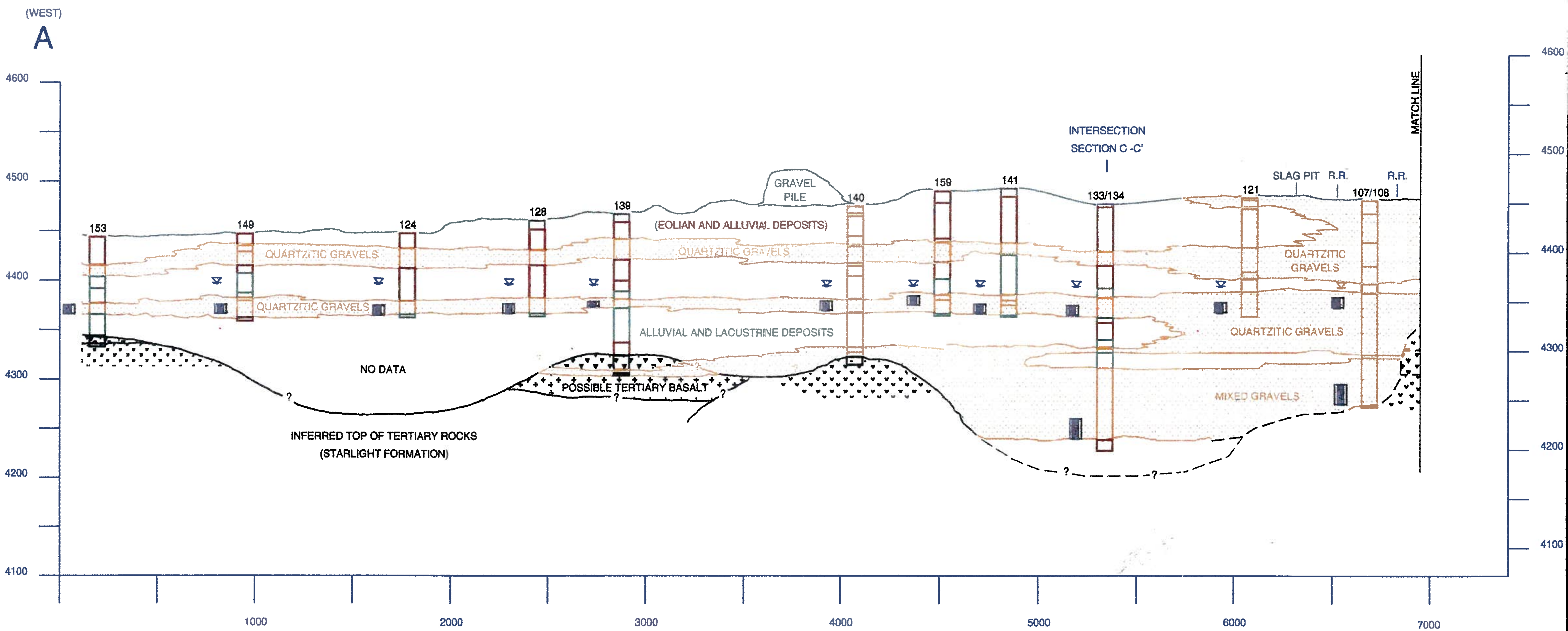
EASTERN MICHAUD FLATS
POCATELLO, IDAHO
Locations of Hydrogeologic Sections
Job Number
Drawing No.
Rev.
FIGURE 5




NOTES:

1) Ground surface line is generalized
2) Vertical exaggeration = 5x
3) Cross-section is generalized. See boring logs in Appendix for further details.

Legend:

- Water level
- Well screen

SAND
GRAVELLY SAND
SILTY SAND
CLAYEY SAND
SANDSTONE
GRAVEL
SAND AND GRAVEL
SILTY, SANDY GRAVEL
SILTY GRAVEL
CLAYEY GRAVEL

SILT
CLAYEY SILT
SANDY SILT
GRAVELLY SILT

CLAY
SILTY CLAY
SANDY CLAY
GRAVELLY CLAY

BASALT
RHYOLITE
TUFF

CALICHE
PEAT

ASPHALT
CONCRETE
FILL

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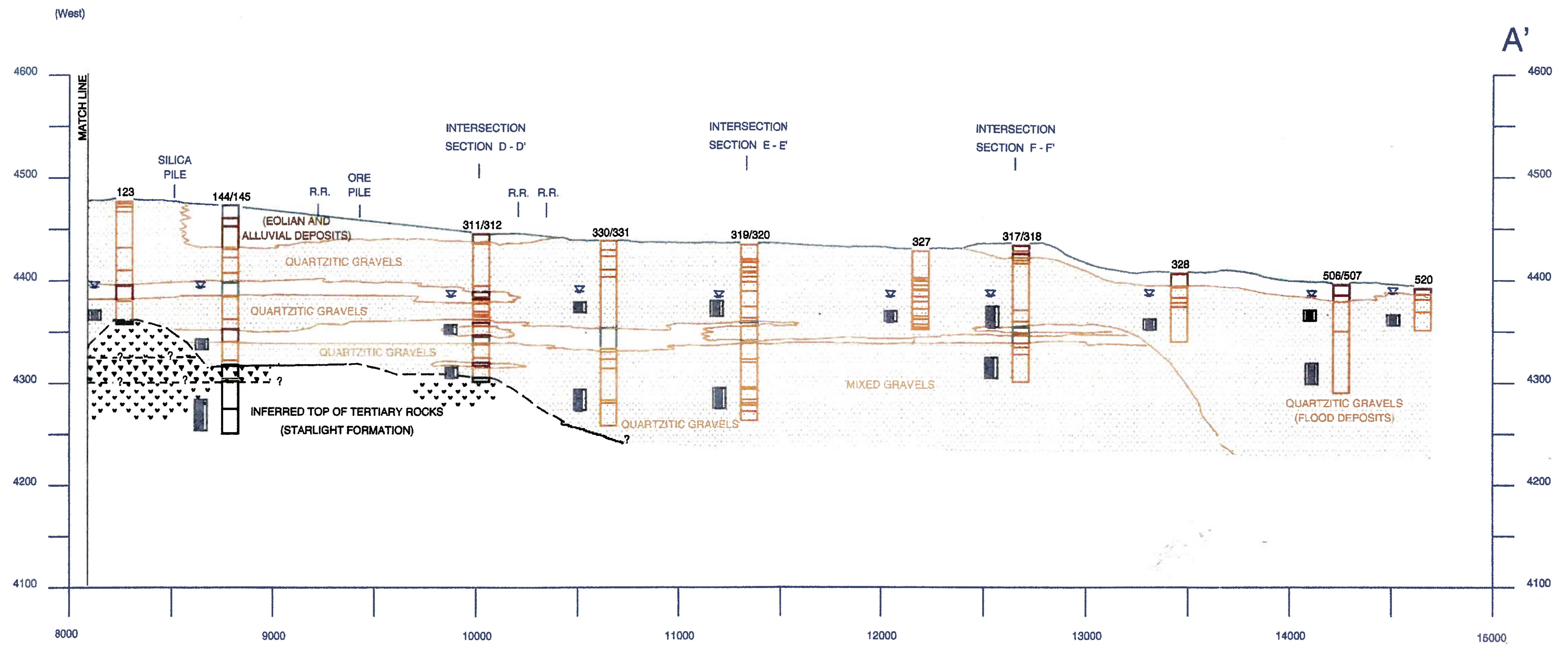
EASTERN MICHAUD FLATS
POCATELLO, IDAHO

**Hydrogeologic Cross-Section A-A'**
**sheet 1 of 2**

Rev.

FIGURE 6




Legend:

- Water Level
- Well Screen

SAND
GRAVELLY SAND
SILTY SAND
CLAYEY SAND
SANDSTONE
GRAVEL
SAND AND GRAVEL
SILTY, SANDY GRAVEL
SILTY GRAVEL
CLAYEY GRAVEL

SILT
CLAYEY SILT
SANDY SILT
GRAVELLY SILT

CLAY
SILTY CLAY
SANDY CLAY
GRAVELLY CLAY

BASALT
RHYOLITE
TUFF

CALICHE
PEAT

ASPHALT
CONCRETE
FILL

NOTES:

1) Ground surface line is generalized
2) Vertical exaggeration = 5x
3) Cross-section is generalized. See boring logs in Appendix for further details.

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EASTERN MICHAUD FLATS
POCATELLO, IDAHO

**Hydrogeologic Cross-Section A-A' sheet 2 of 2**

FIGURE 7

Rev.

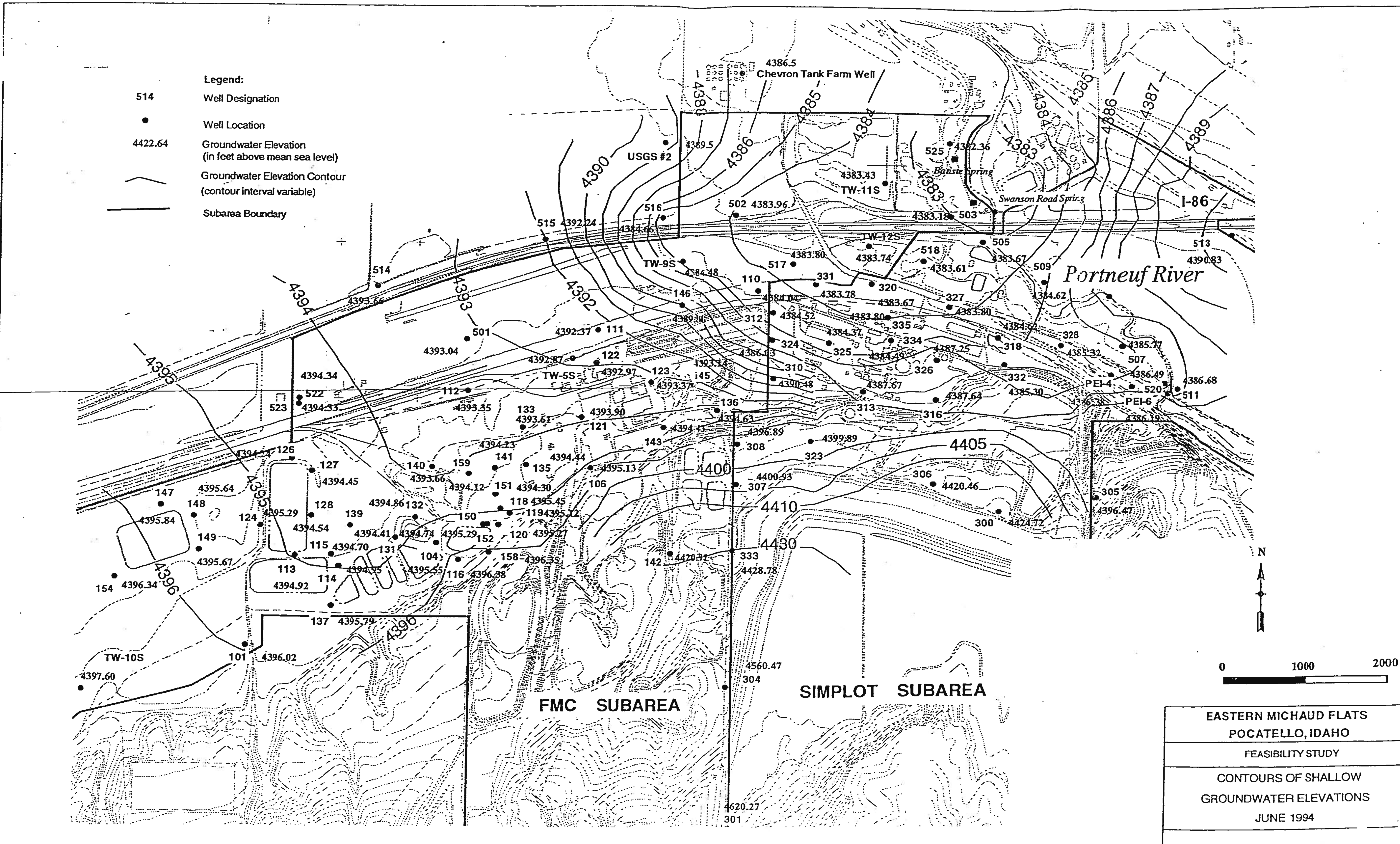
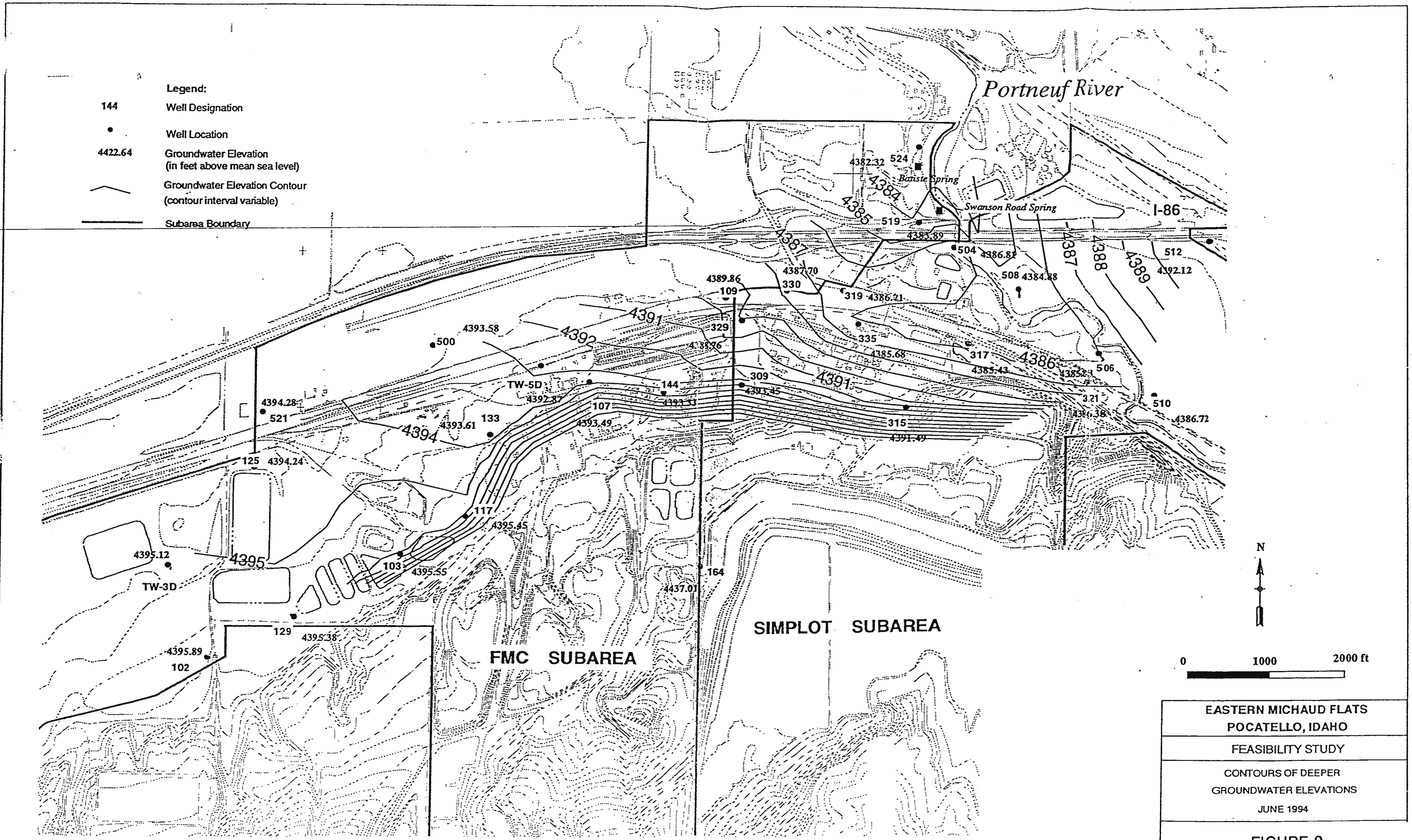

Legend:
514 Well Designation
Well Location
4422.64 Groundwater Elevation (in feet above mean sea level)
Groundwater Elevation Contour (contour interval variable)
Subarea Boundary
Chevron Tank Farm Well
USGS #2
Batiste Spring
Swanson Road Spring
I-86
Portneuf River
TW-11S
TW-12S
TW-9S
TW-5S
TW-10S
PEI-4
PEI-6
FMC SUBAREA
SIMPLOT SUBAREA
N
0
1000
2000 ft
EASTERN MICHAUD FLATS
POCATELLO, IDAHO
FEASIBILITY STUDY
CONTOURS OF SHALLOW
GROUNDWATER ELEVATIONS
JUNE 1994

FIGURE 8

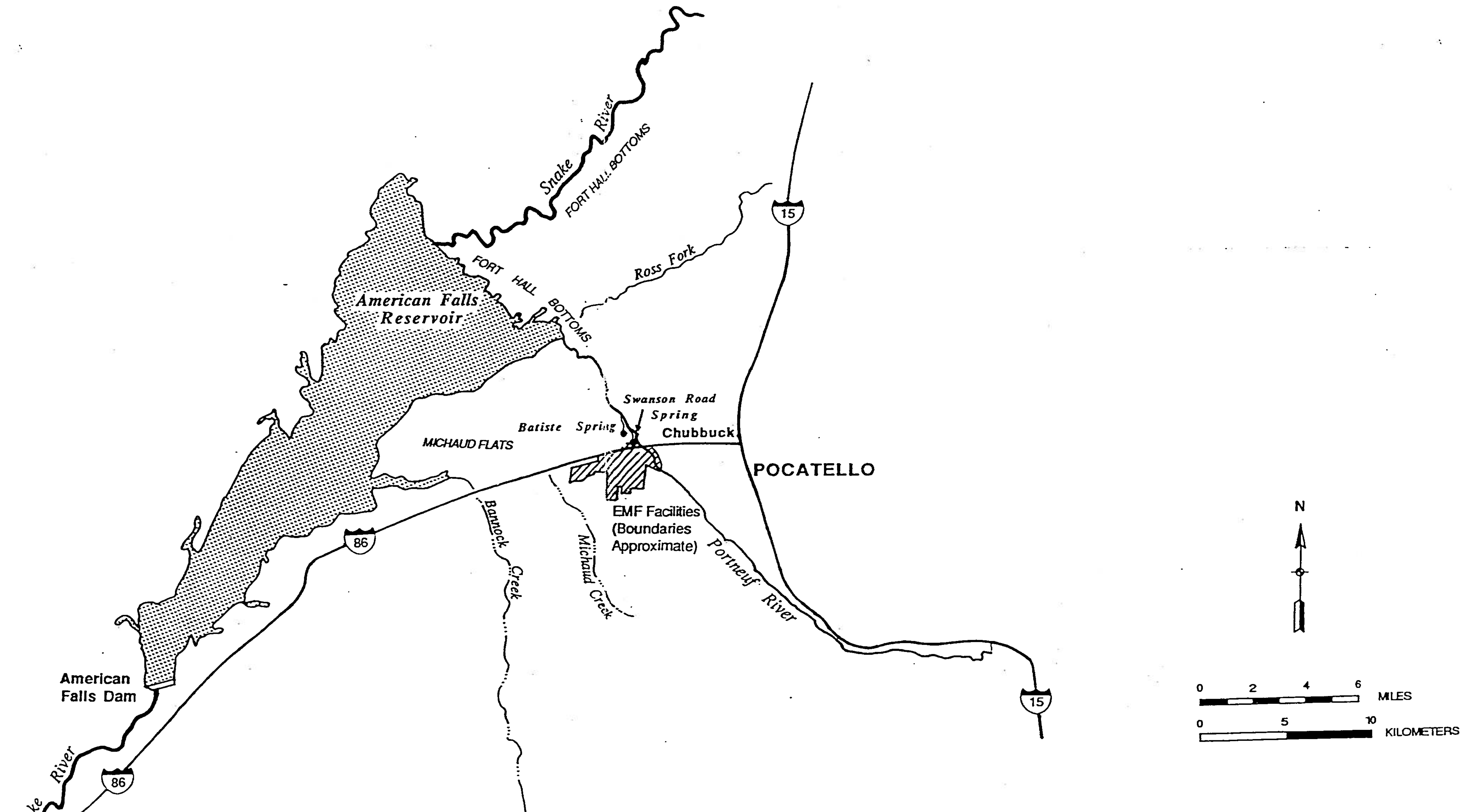



EASTERN MICHAUD FLATS
POCATELLO, IDAHO

FEASIBILITY STUDY

CONTOURS OF DEEPER GROUNDWATER ELEVATIONS
JUNE 1994

FIGURE 9



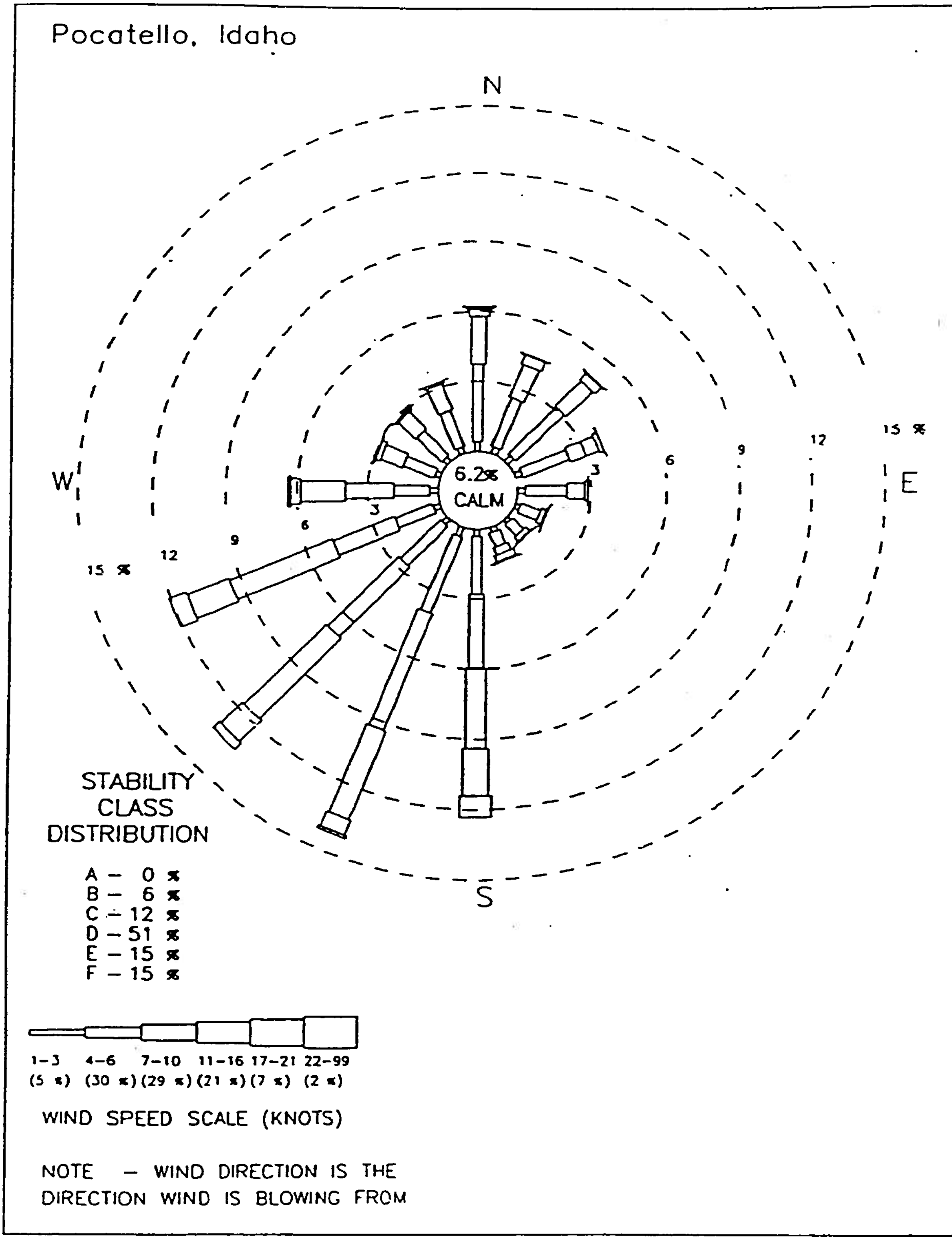

Reference: USGS Idaho Falls and Pocatello Topographic Maps, 1962 - 1:250,000 series

EASTERN MICHAUD FLATS
POCATELLO, IDAHO

FEASIBILITY STUDY

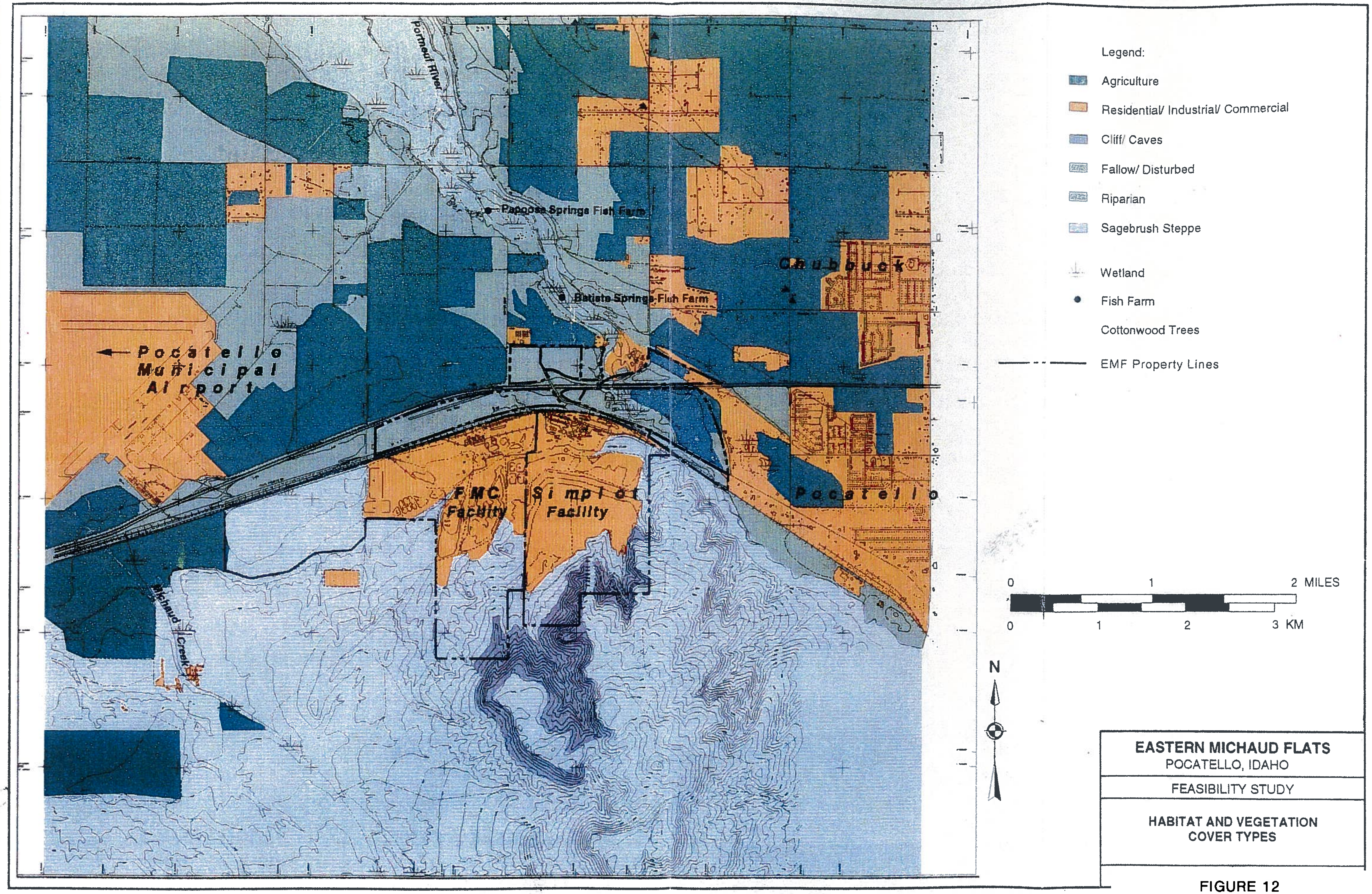
MAJOR SURFACE WATER FEATURES IN THE REGION

FIGURE 10




SOURCE: Bechtel 1994.

FIGURE 11 WIND ROSE, POCATELLO AIRPORT, 1984 TO 1989



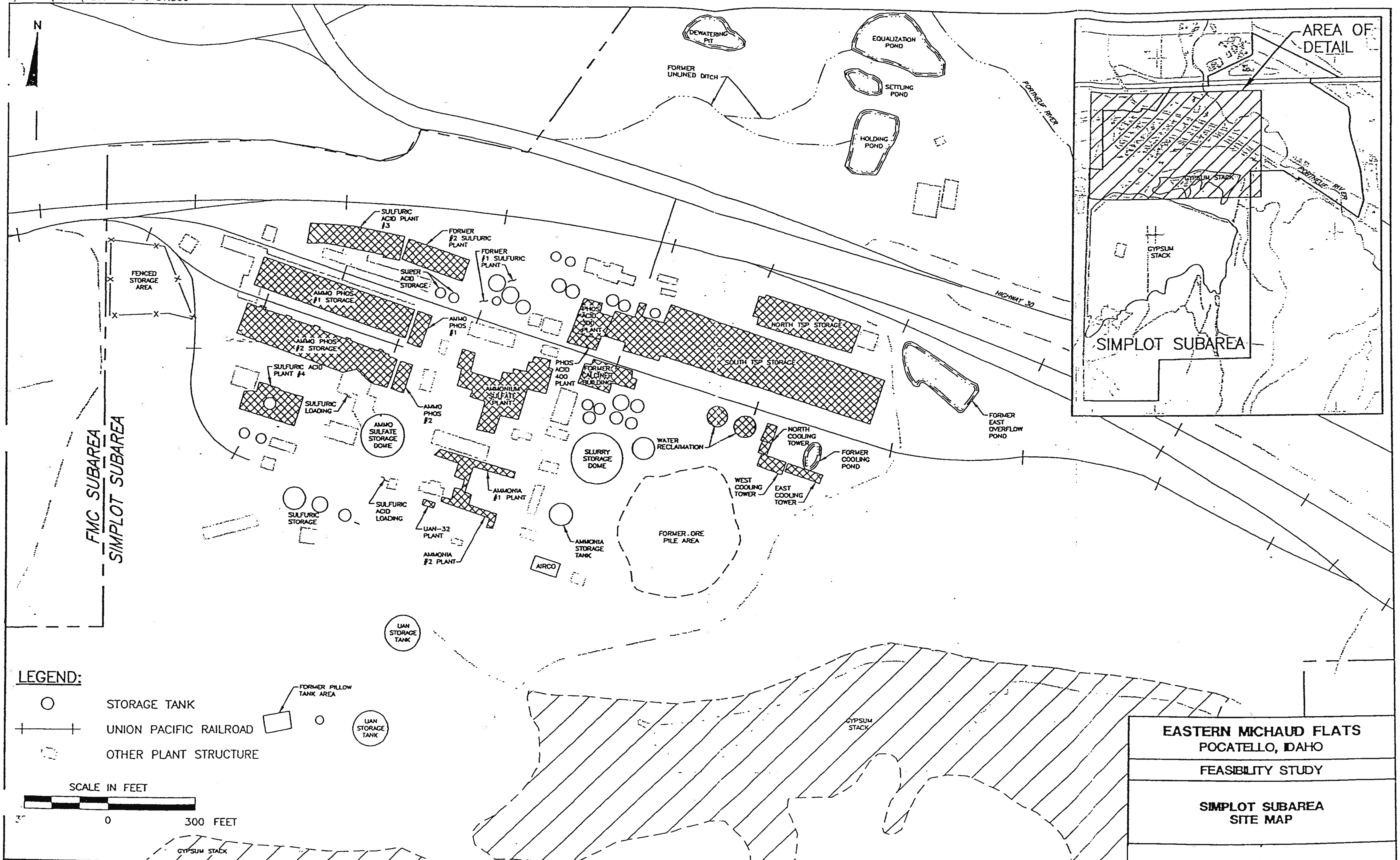

**EASTERN MICHAUD FLATS**
POCATELLO, IDAHO

FEASIBILITY STUDY

**HABITAT AND VEGETATION COVER TYPES**

**FIGURE 12**

4/95 D:\5205\5205-17.DWG BY:SCG

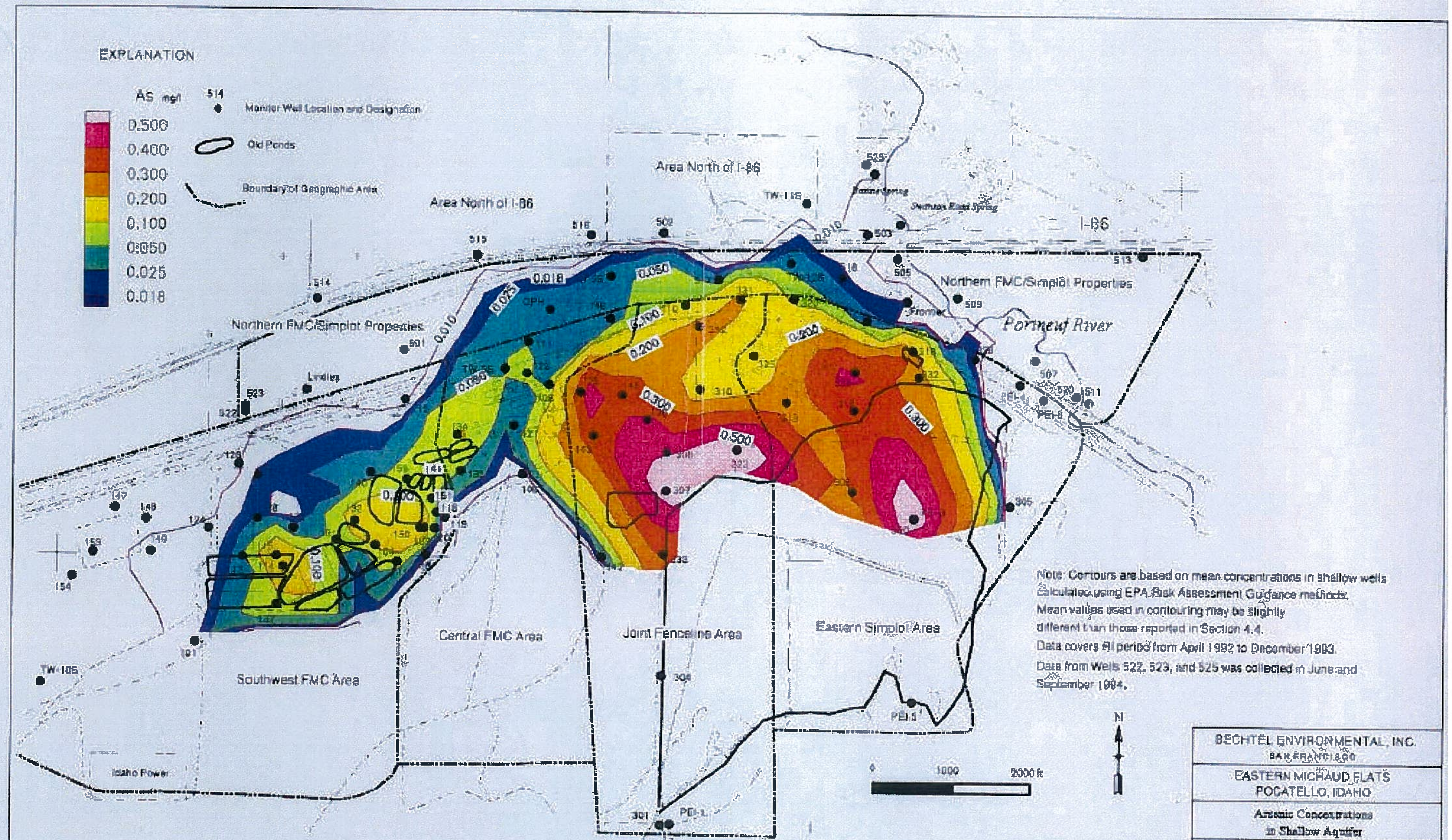



**EASTERN MICHAUD FLATS**
**POCATELLO, IDAHO**

**FEASIBILITY STUDY**

**SIMPLOT SUBAREA SITE MAP**

FIGURE 13


EXPLANATION
AS mg/l
0.500
0.400
0.300
0.200
0.100
0.050
0.025
0.018
Monitor Well Location and Designation
Old Ponds
Boundary of Geographic Area
Area North of I-86
Area North of I-86
I-86
Northern FMC/Simplot Properties
Northern FMC/Simplot Properties
Portneuf River
Central FMC Area
Joint Fenceline Area
Eastern Simplot Area
Southwest FMC Area
Idaho Power
Note: Contours are based on mean concentrations in shallow wells calculated using EPA Risk Assessment Guidance methods.
Mean values used in contouring may be slightly different than those reported in Section 4.4.
Data covers RI period from April 1992 to December 1993.
Data from Wells 522, 523, and 525 was collected in June and September 1994.
0
1000
2000 ft
N
BECHTEL ENVIRONMENTAL, INC.
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EASTERN MICHAUD FLATS
POCATELLO, IDAHO
Arsenic Concentrations in Shallow Aquifer

FIGURE 14

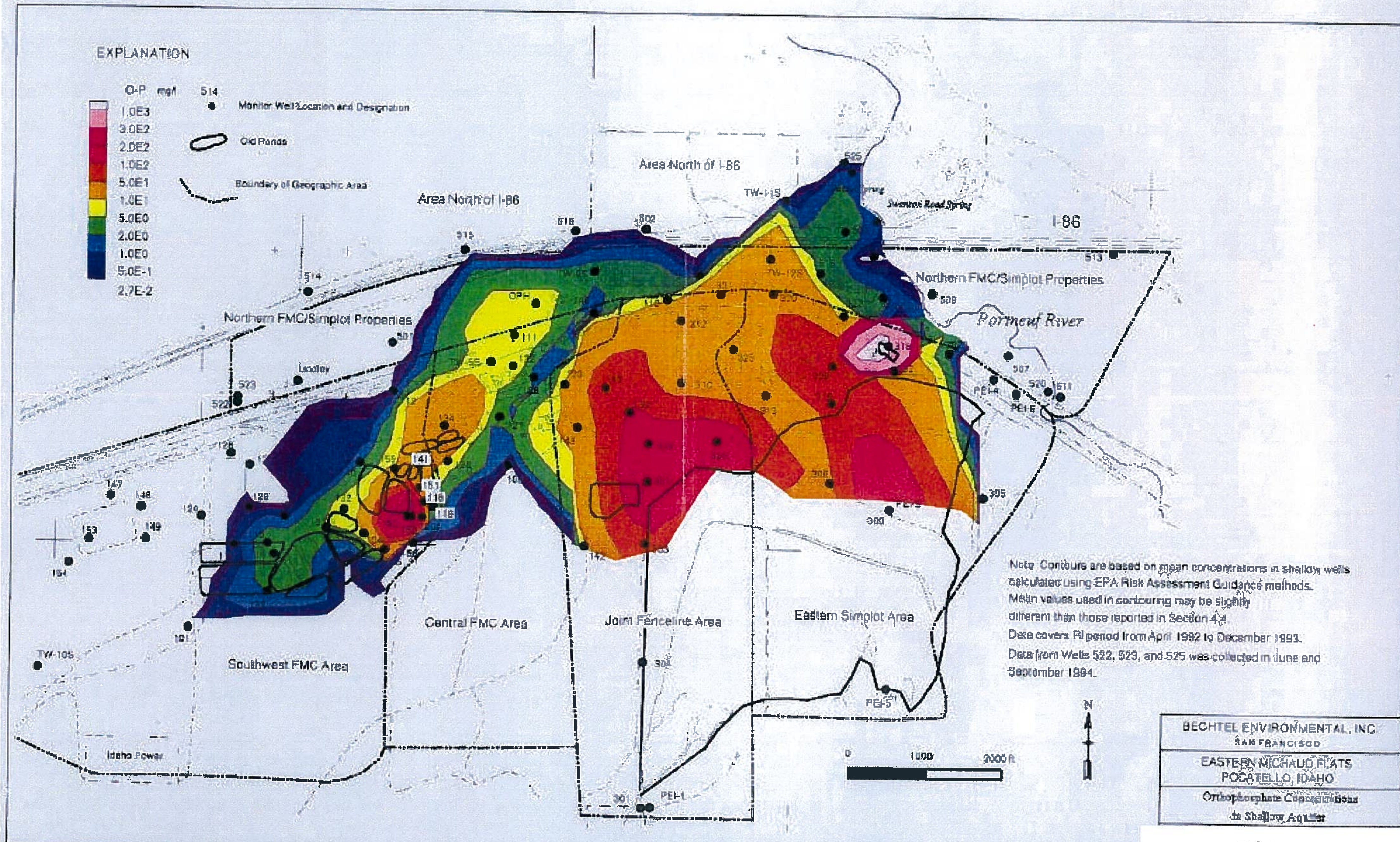
EXPLANATION
O-P mg/l
1.0E3
3.0E2
2.0E2
1.0E2
5.0E1
1.0E1
5.0E0
2.0E0
1.0E0
5.0E-1
2.7E-2
514 Monitor Well Location and Designation
Old Ponds
Boundary of Geographic Area
Area North of I-86
Area North of I-86
I-86
Swanson Road Spring
Northern FMC/Simplot Properties
Northern FMC/Simplot Properties
Portneuf River
Lindley
Central FMC Area
Joint Fenceline Area
Eastern Simplot Area
Southwest FMC Area
Idaho Power
Note: Contours are based on mean concentrations in shallow wells calculated using EPA Risk Assessment Guidance methods. Mean values used in contouring may be slightly different than those reported in Section 4.4.
Data covers RI period from April 1992 to December 1993.
Data from Wells 522, 523, and 525 was collected in June and September 1994.
0 1000 2000 ft
N
BECHTEL ENVIRONMENTAL, INC.
SAN FRANCISCO
EASTERN MICHAUD FLATS
POCATELLO, IDAHO
Orthophosphate Concentrations in Shallow Aquifer

FIGURE 15

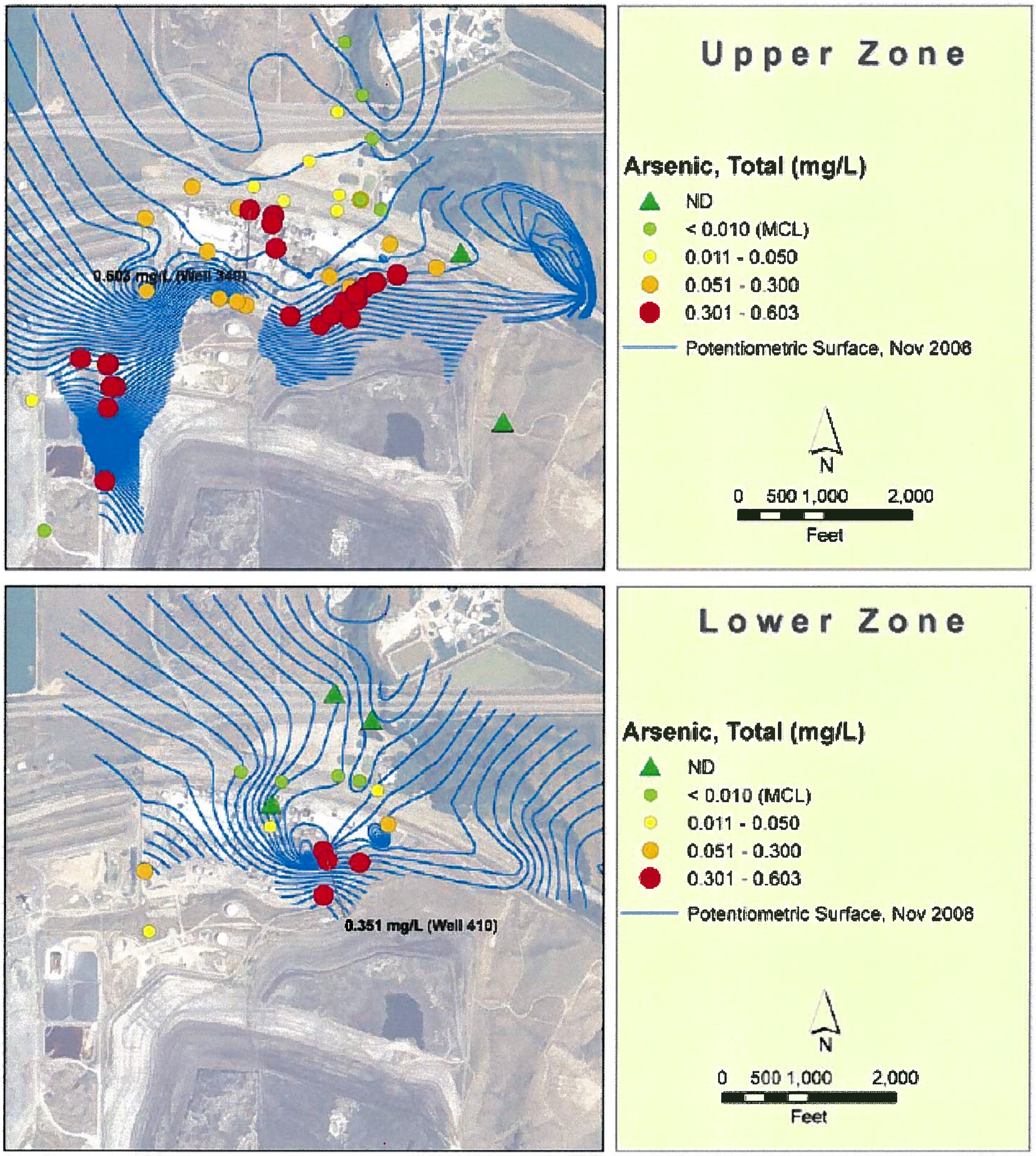


FIGURE 16 **Post plots of Arsenic (total) in Upper and Lower Zones, fourth quarter 2008. Maximum observed concentrations are posted.**

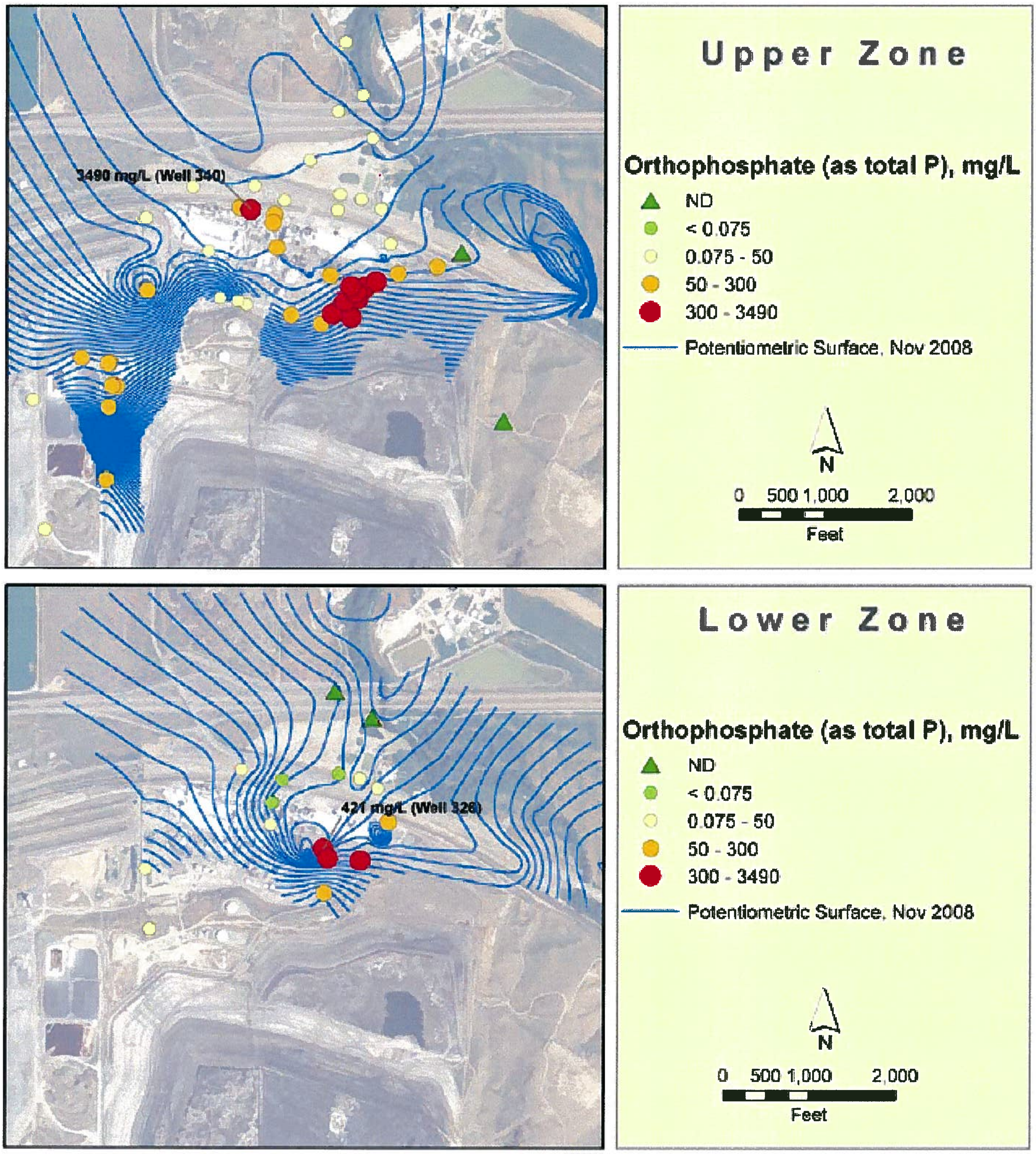


FIGURE 17 **Post plots of Orthophosphate (as Total Phosphorus) in Upper and Lower Zones, fourth quarter 2008. Maximum observed concentrations are posted.**